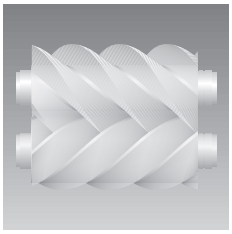

Instruction book for compressors

GA11 - GA15 - GA18 - GA22

F1042

F051

Important
This book applies exclusively:

1. To GA11 - GA15 - GA18 - GA22 equipped with an electronic regulator as shown on the left above. For these compressors, this book must be used together with the "User manual for electronic regulator for GA5 up to GA45 compressors"
2. To GA11 - GA15 - GA18 - GA22 with an electro-pneumatic regulator as shown on the left below.

From serial number AII-217 792 onwards

This instruction book meets the requirements for instructions specified by the machinery directive 89/392/EEC and is valid for CE as well as non-CE labelled machines

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1995-09

Atlas Copco Industrial Air Division - B-2610 Wilrijk - Belgium

* 2 9 2 0 1 2 5 6 0 1 *

This instruction book describes how to handle the machines to ensure safe operation, optimum efficiency and long service life.

Read this book before putting the machine into operation to ensure correct handling, operation and proper maintenance from the beginning. The maintenance schedule comprises measures for keeping the machine in good condition.

Keep the book available for the operator and make sure that the machine is operated and that maintenance is carried out according to the instructions. Record all operating data, maintenance performed, etc. in an operator's logbook available from Atlas Copco. Follow all relevant safety precautions, including those mentioned on the cover of this book.

Repairs must be carried out by trained personnel from Atlas Copco who can be contacted for any further information.

In all correspondence always mention the type and the serial number, shown on the data plate.

For all data not mentioned in the text, see sections "Preventive maintenance schedule" and "Principal data".

The company reserves the right to make changes without prior notice.

CONTENTS

Page

1 Leading particulars . . . 3
- 1.1 General description . . . 3
  - 1.1.1 Air flow . . . 3
  - 1.1.2 Oil system . . . 3
  - 1.1.3 Cooling and condensate drain systems . . . 5
- 1.2 Unloading/loading system . . . 5
  - 1.2.1 Unloading . . . 5
  - 1.2.2 Loading . . . 6
- 1.3 Electrical system for GA Pack / Full-feature . . . 6
- 1.4 Electronic control module for GA Pack / Full-feature . . . 8
  - 1.4.1 Electronic regulator . . . 8
  - 1.4.2 Control panel . . . 11
- 1.5 Electrical system for GA Standard Pack . . . 14
  - 1.5.1 Regulator . . . 15
  - 1.5.2 Control panel . . . 15
- 1.6 Air dryer on GA Full-feature . . . 15
  - 1.6.1 Compressed air circuit . . . 15
  - 1.6.2 Refrigerant circuit . . . 15

2 Installation . . . 16
- 2.1 Dimension drawings . . . 16
- 2.2 Electric cable size, settings of overload relay and main fuses . . . 18
  - 2.2.1 Electric cable size . . . 18
  - 2.2.2 Setting of motor overload relay and fuse value 18
- 2.3 Installation proposals . . . 19
- 2.4 Electrical connections . . . 22
- 2.5 Pictographs . . . 23

3 Operating instructions . . . 24
- 3.1 Before initial start-up . . . 24
  - 3.1.1 Safety precautions . . . 24
  - 3.1.2 User manual (GA Pack / Full-feature only) . . . 24
  - 3.1.3 Outdoor/altitude operation . . . 24
  - 3.1.4 Handling . . . 24
  - 3.1.5 External compressor status indication (GA Pack / Full-feature only) . . . 24
  - 3.1.6 Compressor control modes (GA Pack / Full-feature only) . . . 24
- 3.2 Initial start-up . . . 24
- 3.3 Starting . . . 25
- 3.4 During operation . . . 25
  - 3.4.1 Checking the display (GA Pack / Full-feature only) . . . 25
- 3.5 Manual control for GA Pack / Full-feature . . . 26
- 3.6 Stopping . . . 26
- 3.7 Taking out of operation at end of compressor service life . . . 26

Page

4 Maintenance . . . 26
- 4.1 Compressor motor . . . 26
- 4.2 Preventive maintenance schedule for the compressor 27
- 4.3 Oil and oil filter change interval . . . 28
- 4.4 Oil specifications . . . 28
  - 4.4.1 Atlas Copco Roto-injectfluid . . . 28
  - 4.4.2 Mineral oil . . . 28
- 4.5 Oil and oil filter change . . . 28
- 4.6 Storage after installation . . . 29
- 4.7 Service kits . . . 29

5 Adjustments and servicing procedures . . . 29
- 5.1 Air filter . . . 29
- 5.2 Coolers . . . 29
- 5.3 Safety valve . . . 29
- 5.4 Belt set exchange . . . 29
- 5.5 Fan control switch on GA Full-feature . . . 29
- 5.6 High pressure shut-down switch on GA Full-feature . . 29
- 5.7 Expansion valve on GA Full-feature . . . 29
- 5.8 Load/unload pressure switch on GA Standard Pack . . 30
- 5.9 Temperature shut-down switch on GA Standard Pack . 30

6 Problem solving . . . 31

7 Principal data . . . 33
- 7.1 Readings . . . 33
  - 7.1.1 Readings on display on GA Pack / Full-feature 33
  - 7.1.2 Readings on gauges on GA Standard Pack . . 33
- 7.2 Setting of safety valve . . . 33
- 7.3 Dryer control switches and refrigerant specifications on GA Full-feature . . . 33
- 7.4 Compressor specifications . . . 33
  - 7.4.1 Reference conditions . . . 33
  - 7.4.2 Limitations . . . 33
  - 7.4.3 Specifications of GA 7.5 bar . . . 34
  - 7.4.4 Specifications of GA 10 bar . . . 34
  - 7.4.5 Specifications of GA 13 bar . . . 34
  - 7.4.6 Specifications of GA 100 psi . . . 35
  - 7.4.7 Specifications of GA 125 psi . . . 35
  - 7.4.8 Specifications of GA 150 psi . . . 36
  - 7.4.9 Specifications of GA 175 psi . . . 36
- 7.5 Conversion list of SI units into US/British units . . . 36

1 LEADING PARTICULARS

1.1 General description

GA are stationary, single-stage, oil-injected screw compressors driven by an electric motor. GA11 up to GA22 are air-cooled.

GA Standard Pack (Figs. 3)
The compressors are enclosed in a sound-insulated bodywork. A control panel including the start/stop switch is provided. An electric cabinet comprising the relay-controlled regulator and motor starter is located behind this panel.

GA Pack (Figs. 2)
The compressors are enclosed in a sound-insulated bodywork. The front panel comprises an electronic control module including the start and stop buttons. An emergency stop button is also provided. An electric cabinet comprising the motor starter is located behind this panel. An automatic condensate drain system is provided.

GA Full-feature (Fig. 1)
GA Full-feature are GA Pack compressors additionally provided with an air dryer integrated in the bodywork. The dryer removes moisture from the compressed air by cooling the air to near freezing point and automatically draining the condensate. See section 1.6.

Fig. 1. GA22 Full-feature

Options and special versions

	Full-feature	Pack	Standard Pack
Energy recovery kit	0	0	NA
Integrated oil separator (OSD) **1)**	0	0	0
High ambient version (up to 50 C)	NA	0	0
Public works version	0	0	0
Oil protecting frame plate	0	0	0
Modulating control regulator	0	0	0
Integrated condensate separator (WSD)	S	S	0
Integrated dryer	S	0	NA
8 bar version	0	0	0
Electronic drain	0	0	0
Dryer by-pass	0	0	NA
Silencing kit	0	0	0
Relay expansion box	0	0	NA

0 = optional S = standard NA = not available

1.1.1 Air flow (Fig. 4)

Air drawn through filter (AF) and open inlet valve (IV) into compressor element (E) is compressed. The compressed air flows through oil separator (OS), minimum pressure valve (Vp) and air cooler (Ca) to outlet valve (AV).

1.1.2 Oil system (Fig. 4)

Air pressure forces the oil from air receiver (AR) through oil cooler (Co) and filter (OF) to compressor element (E) and the lubrication points.

The system comprises a by-pass valve (BV). When the oil temperature is below 40 C (104 F) **2)**, there is no oil flow to the oil cooler. At approx. 55 C (131 F) **2)**, the valve is closed so that all the oil passes through the cooler.

1) If an oil separator is desired for Pack and Full-feature compressors equipped with an energy recovery kit, a freestanding OSD must be applied.

2) For 13 bar/175 psi compressors, these temperatures are 60 C (140 F) and 75 C (167 F) respectively

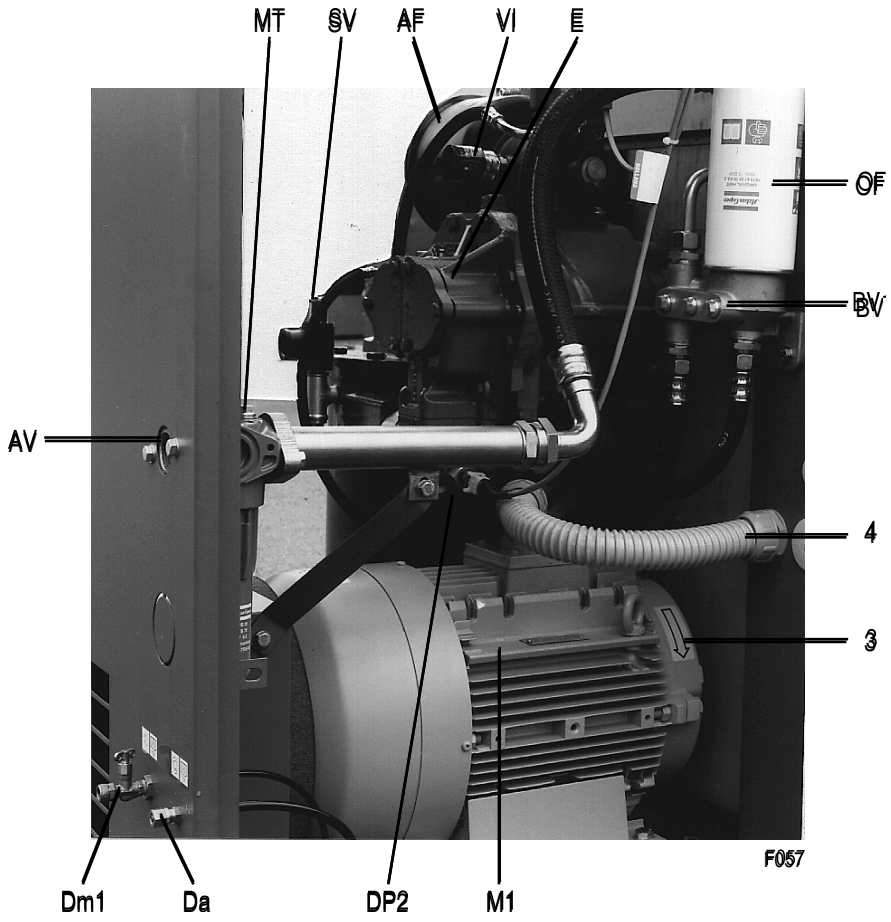


Fig. 2a. GA Pack, motor side

AF.	Air filter
AR.	Air receiver
AV.	Air outlet valve
BV.	By-pass valve, oil circuit
Ca.	Air cooler
Co.	Oil cooler
Da.	Automatic condensate drain outlet
Dm1.	Manual condensate drain valve
DP1/DP2.	Oil drain plugs
E.	Compressor element
FC.	Oil filler plug
FN.	Compressor cooling fan
GI.	Oil level indicator
M1.	Motor
MT.	Moisture trap
OF.	Oil filter
PSR19.	Load/unload pressure switch
SV.	Safety valve
VI.	Air filter service indicator
VP.	Vent plug, oil circuit
Vp.	Minimum pressure valve

1. Dryer
2. Control panel
3. Arrow, direction of rotation of drive motor
4. Motor voltage supply
5. Belt tensioning bolt
6. Transport spacer/bolt
7. Side panel
8. Bolt
9. Bolt
10. Arrow, direction of rotation of drive motor

Figs. 1 up to 3. General views

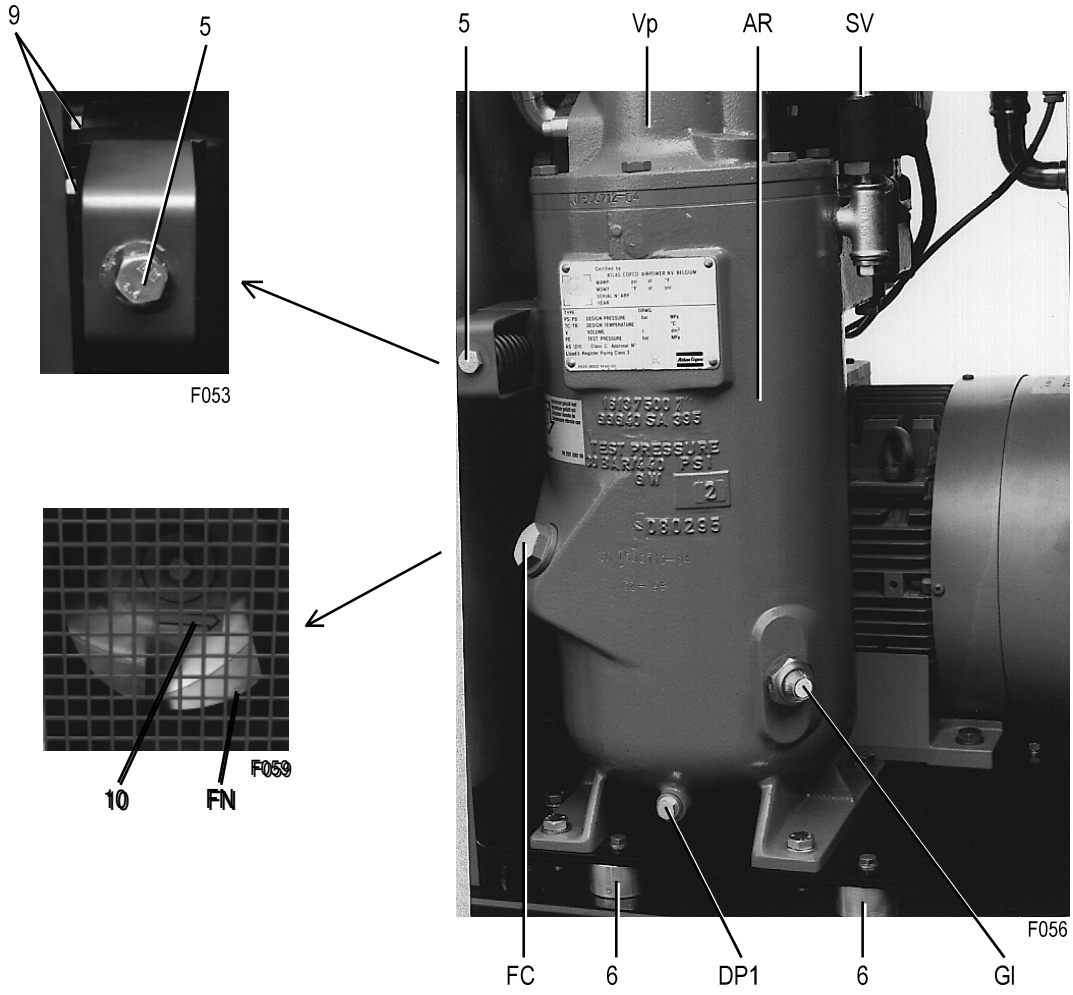


Fig. 2b. GA Pack/Full-feature, receiver side

1.1.3 Cooling and condensate drain systems

The cooling system comprises air cooler (Ca-Fig. 1) and oil cooler (Co). The cooling air is generated by fan (FN).

A moisture trap (MT-Fig. 2a) is provided in the air outlet system of GA Pack and Full-feature compressors. **1)**. The trap is equipped with a valve for automatic condensate draining during operation (Da) and a manually operated valve for draining after stopping the compressor (Dm1).

1.2 Unloading/loading system (Fig. 4)

1.2.1 Unloading

If the air consumption is less than the air output of the compressor, the net pressure increases. When the net pressure reaches the unloading pressure, solenoid valve (Y1) is de-energized. The plunger of the valve returns by spring force:

1. The control pressure present in the chambers of loading plunger (LP) and unloading valve (UV) is vented to atmosphere via solenoid valve (Y1).
2. Loading plunger (LP) moves upwards and causes inlet valve (IV) to close the air inlet opening.
3. Unloading valve (UV) is opened by receiver pressure. The pressure from air receiver (AR) is released towards unloader (UA).

Air output is stopped (0 %), the compressor runs unloaded.

1) Available as option on GA Standard Pack.

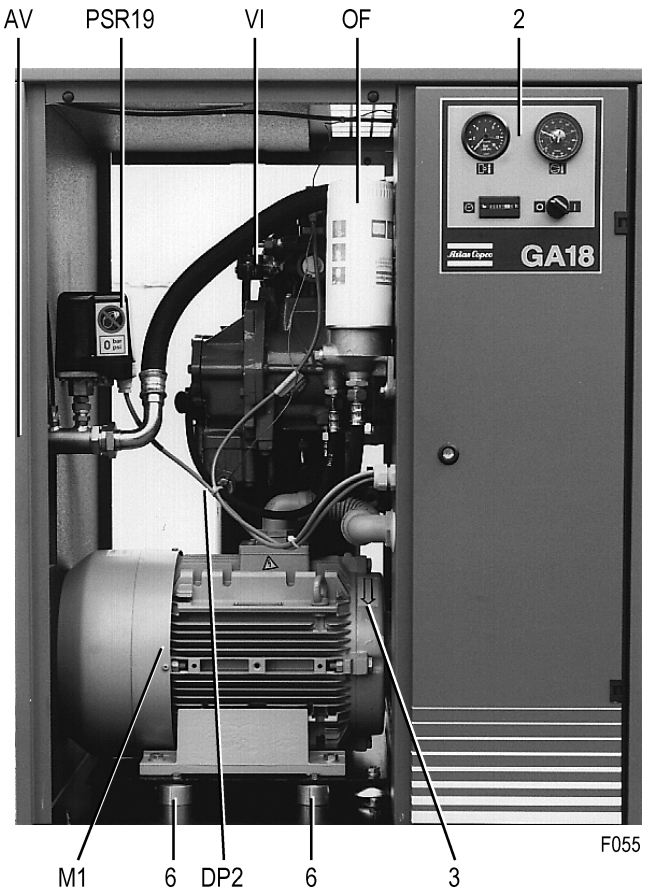


Fig. 3a. GA18 Standard Pack, motor side

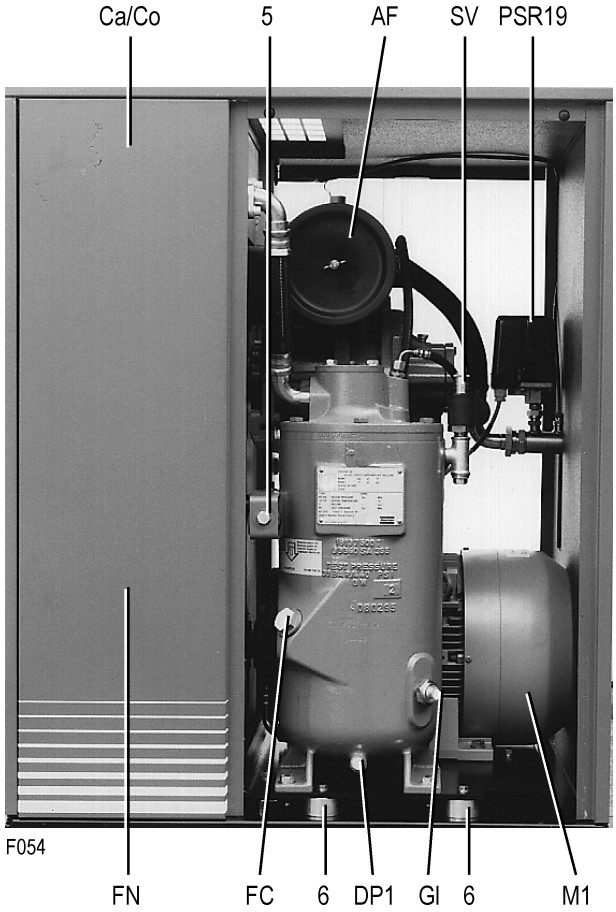


Fig. 3b. GA18 Standard Pack, receiver side

1.2.2 Loading

When the net pressure decreases to the loading pressure, solenoid valve (Y1) is energized. The plunger of the valve moves against spring force:

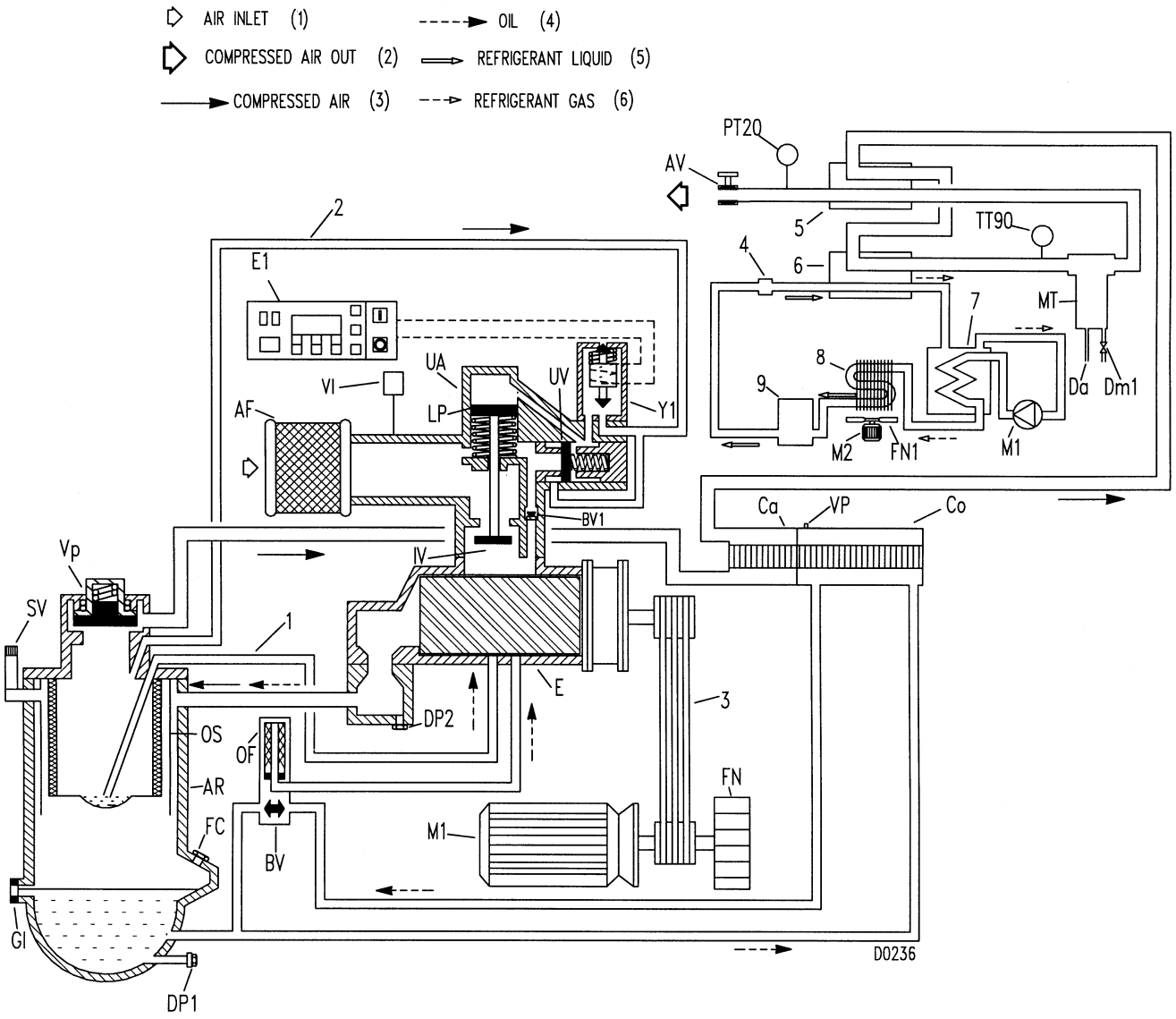
1. Control pressure is fed from air receiver (AR) via solenoid valve (Y1) to loading plunger (LP) and unloading valve (UV).
2. Unloading valve (UV) closes the air blow-off opening. Loading plunger (LP) moves downwards and causes inlet valve (IV) to open fully.

Air output is resumed (100 %), the compressor runs loaded.

1.3 Electrical system for GA Pack / Full-feature

The system comprises:

1. Compressor motor (M1-Fig. 2a)
2. Electronic control module (Fig. 7a)
3. Compressor start button (I) and stop button (O) (Fig. 7a)
4. Emergency stop button (S3-Fig. 7a)
5. Electric cabinet (Fig. 5a)
6. Sensors for the compressor element outlet temperature (TT11) and for the air outlet pressure (PT20)
7. Dewpoint temperature sensor (TT90) for Full-feature compressors



AF.	Air filter
AR.	Air receiver
AV.	Air outlet valve
BV.	Oil cooler by-pass valve
Ca.	Air cooler
Co.	Oil cooler
Da.	Automatic condensate drain outlet
Dm1.	Manual condensate drain valve
DP1/DP2.	Oil drain plugs
E.	Compressor element
E1.	Control module
FC.	Oil filler plug
FN.	Fan
Gl.	Oil level indicator
IV.	Inlet valve
LP.	Loading plunger
M1.	Compressor motor
MT.	Moisture trap
OF.	Oil filter
OS.	Oil separator element
PT20.	Pressure sensor, air outlet
SV.	Safety valve
TT90.	Temperature sensor, dewpoint
UA.	Unloader
UV.	Unloading valve
VI.	Air filter service indicator
Vp.	Minimum pressure valve
VP.	Vent plug, oil circuit
Y1.	Loading solenoid valve

1.	Oil scavenging line
2.	Flexible, control air
3.	Belts

On Full-feature also:

FN1.	Fan, dryer condenser
M1.	Refrigerant compressor
M2.	Motor, condenser fan
4.	Expansion valve
5.	Air/air heat exchanger
6.	Air/refrigerant heat exchanger (evaporator)
7.	Liquid separator
8.	Condenser
9.	Liquid receiver

Fig. 4. GA Pack/Full-feature during loading

1.4 Electronic control module for GA Pack / Full-feature

The control module consists of an electronic regulator and a control panel.

1.4.1 Electronic regulator (E1-Fig. 6a)

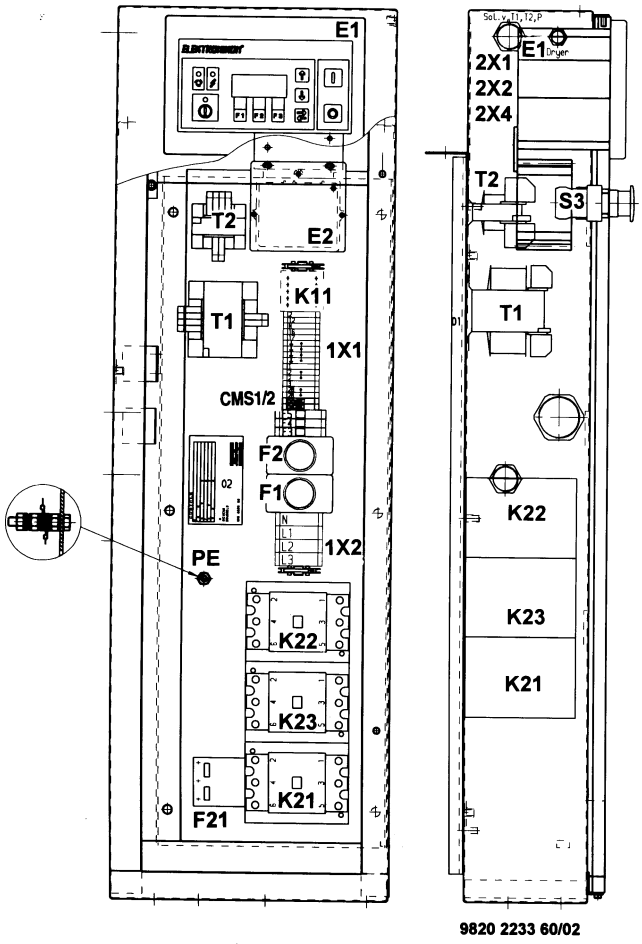
The regulator has following functions:

Controlling the compressor
The regulator maintains the net pressure between programmable limits by automatically loading and unloading the compressor. A number of programmable settings, e.g. the unloading and loading pressures, the minimum stop time and the maximum number of motor starts are taken into account.

The regulator stops the compressor whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases. In case the expected unloading period is too short, the compressor is kept running to prevent too-short standstill periods.

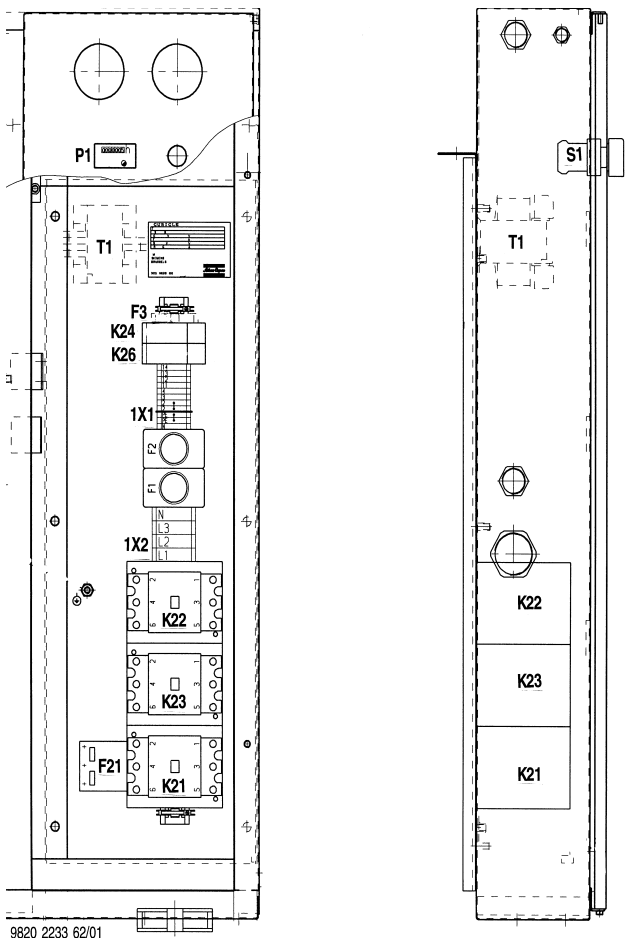
Protecting the compressor
If the compressor element outlet temperature exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on the control panel (Fig. 7a). The compressor will also be stopped in case of overload of compressor motor (M1).

If the compressor element outlet temperature exceeds a programmed value below the shut-down level, this will also be indicated to warn the operator before the shut-down level is reached.



See legend of Figs. 6 for denomination of components

Fig. 5a. Electric cabinet of GA Pack / Full-feature (typical example)



See legend of Figs. 8 for denomination of components

Fig. 5b. Electric cabinet of GA Standard Pack (typical example)

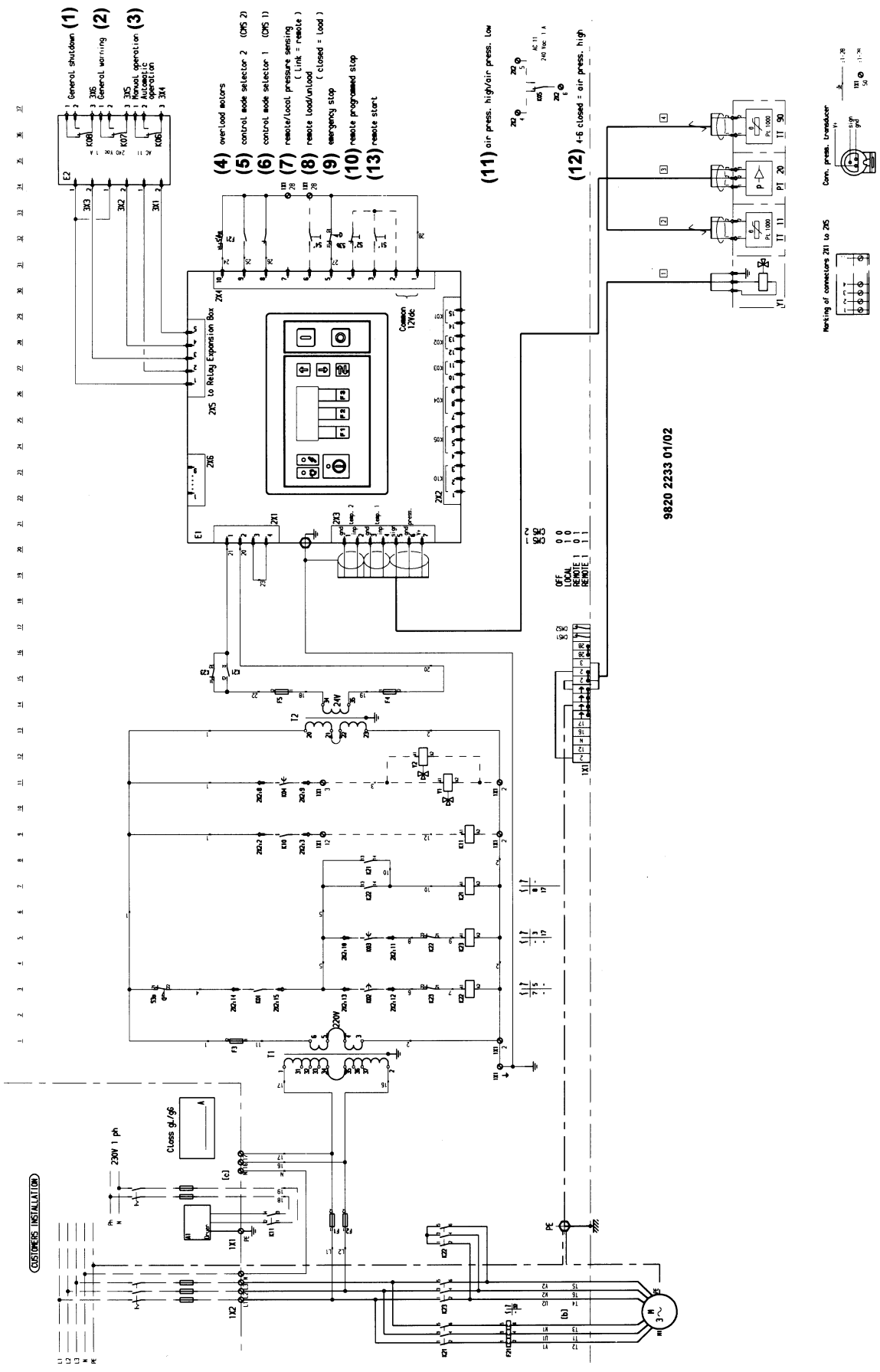

(1) General shutdown
(2) General warning
(3) Manual operation / Automatic operation
(4) overload motors
(5) control mode selector 2 (CMS 2)
(6) control mode selector 1 (CMS 1)
(7) remote/local pressure sensing (Link = remote)
(8) remote load/unload (closed = Load)
(9) emergency stop
(10) remote programmed stop
(13) remote start
(11) air press. high/air press. low
(12) +6 closed = air press. high
2K5 to Relay Expansion Box
Common 12Vdc
OFF
LOCAL
REMOTE
9820 2233 01/02
Conn. press. transducer
Marking of connectors 2X1 to 2X5
CUSTOMERS INSTALLATION
230V 1 ph
Class gl./gG
PE

Fig. 6a. Electrical diagram, GA Pack / Full-feature (50 Hz / star-delta)

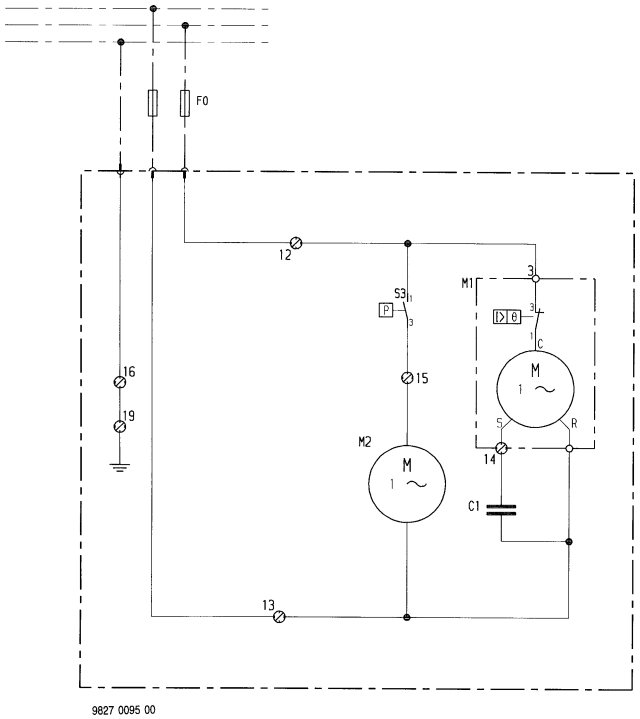


Fig. 6b. Electrical diagram, dryer on GA Full-feature

SENSORS/LOADING SOLENOID VALVE
- PT20. Pressure sensor, air outlet
- TT11. Temperature sensor, compressor element outlet
- TT90. Temperature sensor, dewpoint **1)**
- Y1. Loading solenoid valve
- Y2. Solenoid valve, modulating control (optional)

MOTORS
- M1. Compressor motor

ELECTRIC CABINET
- E2. Relay expansion box (optional)
- F1/F5. Fuses
- F21. Overload relay, compressor motor
- K11. Auxiliary contactor for dryer **1)**
- K21. Line contactor
- K22. Star contactor
- K23. Delta contactor
- T1/T2. Transformers
- 1X1. Terminal strip
- 1X2. Terminal strip

CONTROL MODULE (E1)
- I. Start button
- K01. Blocking relay
- K02. Auxiliary relay, star contactor
- K03. Auxiliary relay, delta contactor
- K04. Auxiliary relay, loading/unloading
- K05. Auxiliary relay, high/low air pressure
- K10. Auxiliary relay, dryer
- O. Stop button
- S3. Emergency stop button
- 2X1/6. Connectors

On GA Full-feature also:
- F0. Fuses (customer's installation)
- C1. Capacitor
- M1. Refrigerant compressor/motor
- M2. Motor, condenser cooling fan
- S3. Control switch, condenser cooling fan

1) Only for Full-feature compressors.

Figs. 6. Electrical diagrams for GA Pack / Full-feature

Monitoring components subject to service

The regulator continuously monitors the oil, oil filter, oil separator and air filter. Each input is compared to programmed time intervals. If these limits are exceeded, a message will appear on the display (Fig. 7a) to warn the operator to replace the indicated component. The number of the service kit will appear on the display.

Automatic restart after voltage failure

For compressors leaving the factory, this function is made inactive. If desired, the function can be activated. Consult Atlas Copco.

If activated and provided the module was in the automatic operation mode, the compressor will automatically restart if the supply voltage to the module is restored within a programmed time period.

1.4.2 Control panel (Fig. 7a)

Indicators, keys and buttons

To control the compressor and to read and modify programmable parameters, the regulator is provided with a panel including:

1 Automatic operation LED
Indicates that the regulator is automatically controlling the compressor: the compressor is loaded, unloaded, stopped and restarted depending on the air consumption and the limitations programmed in the regulator.

2 Voltage on LED
Indicates that the voltage is switched on.

3 General alarm LED
Is normally out. Is alight or blinks in case of an abnormal condition. See below.

4 Display
Indicates:
- the name of the sensor of which the actual reading is displayed
- the unit and actual reading
- messages regarding the operating status, a sensor error, a service need or a fault

5 Function keys
Keys to control and program the compressor. The actual function of each key is abbreviated and indicated on the bottom line. The most common ones are listed below.

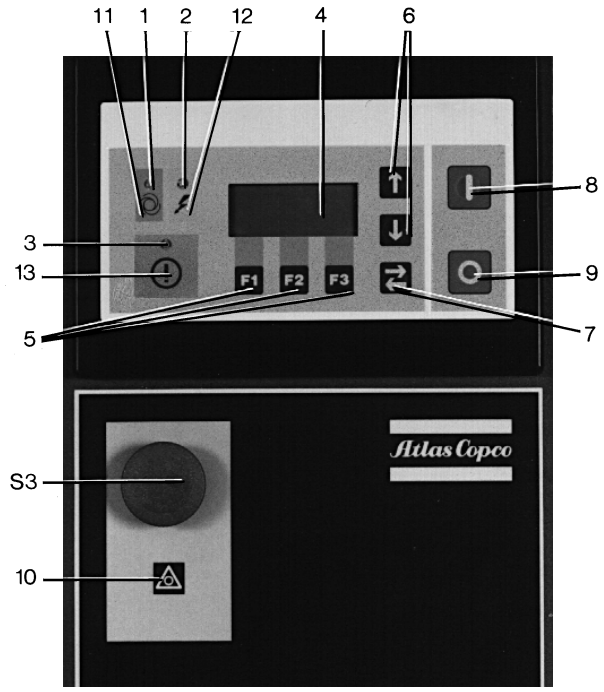
6 Scroll keys
As long as an arrow is shown on the right side of the display, the key with the same symbol can be used to scroll through the display.

7 Tabulator key
Key to go to the next field of the display.

8 Start button
Push button to start the compressor. LED (1) lights up indicating that the regulator is operative (in automatic operation). The LED goes out after unloading the compressor manually.

9 Stop button
Push button to stop the compressor. LED (1) goes out. The compressor will stop after running in unloaded condition for 30 seconds.

S3 Emergency stop button
Push button to stop the compressor immediately in case of emergency. Must be unlocked before restarting.



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S3. Emergency stop button
1. LED, automatic operation
2. LED, voltage on
3. LED, general alarm
4. Display
5. Function keys
6. Scroll keys
7. Tabulator key
8. Start button
9. Stop button
10. Pictograph, emergency stop
11. Pictograph, automatic operation
12. Pictograph, voltage on
13. Pictograph, alarm

Fig. 7a. Control panel of GA Pack / Full-feature

Delivery air		
bar	7.0	
Auto loaded		
Menu	More	Unld
F1	F2	F3

Fig. 7b. Example of the main display

Status data		↓
Main	Slct	
F1	F2	F3

Fig. 7c. Example of a main menu

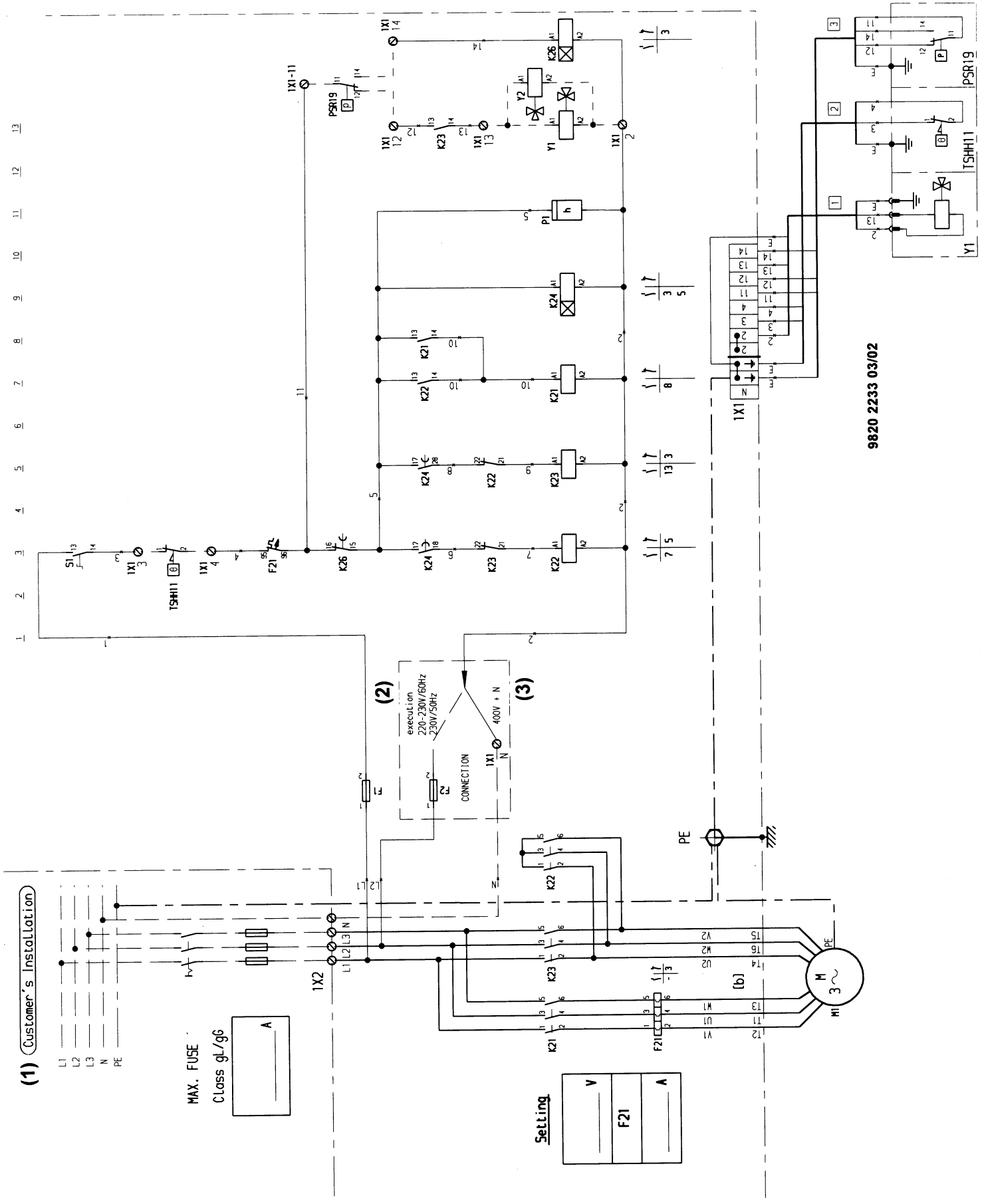
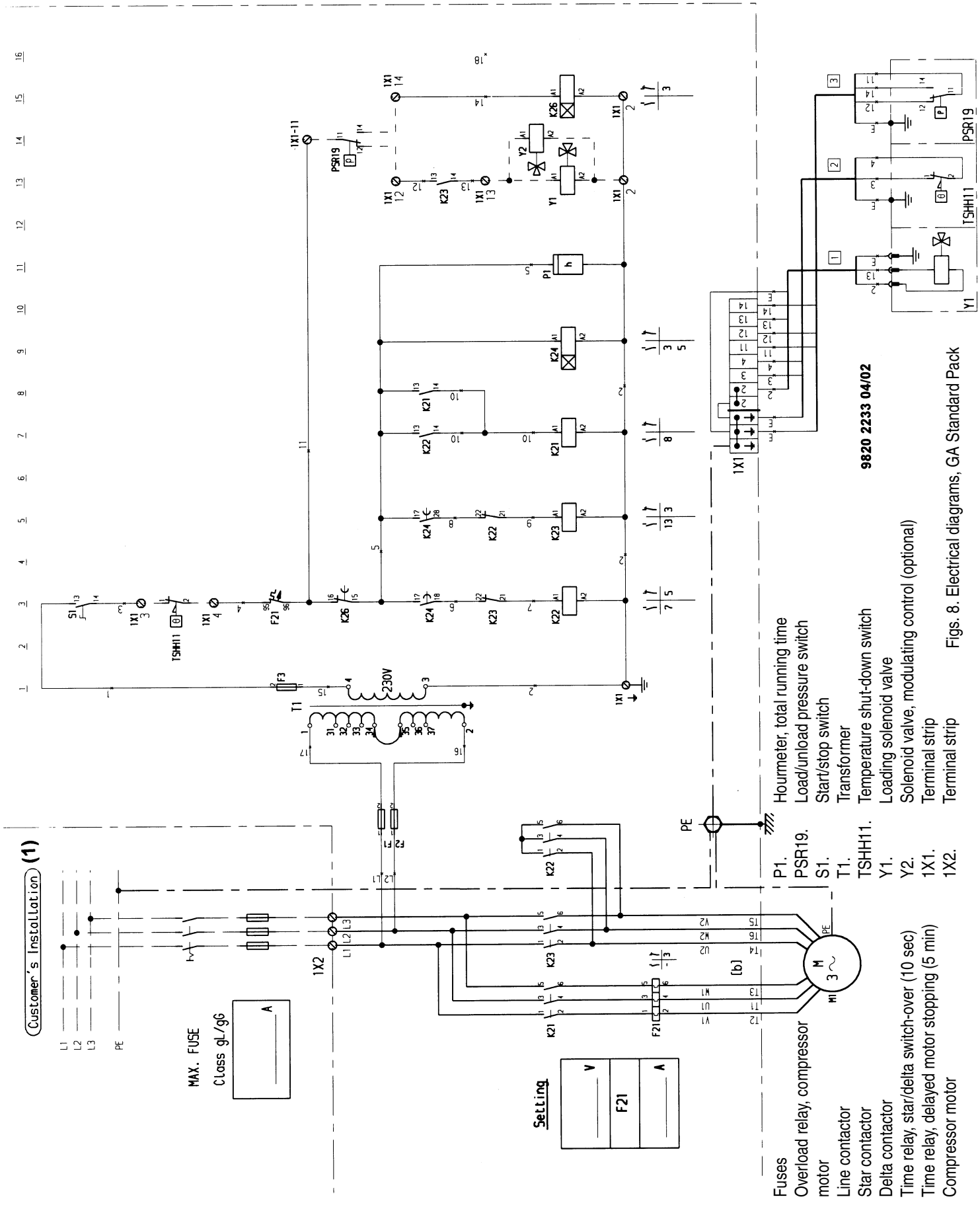


Fig. 8a. Electrical diagram, GA Standard Pack, star-delta, without transformer



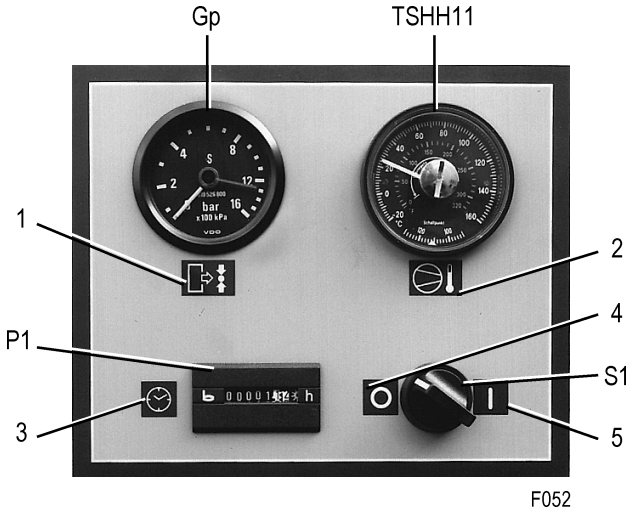
F1/3. Fuses
F21. Overload relay, compressor motor
K21. Line contactor
K22. Star contactor
K23. Delta contactor
K24. Time relay, star/delta switch-over (10 sec)
K26. Time relay, delayed motor stopping (5 min)
M1. Compressor motor
P1. Hourmeter, total running time
PSR19. Load/unload pressure switch
S1. Start/stop switch
T1. Transformer
TSHH11. Temperature shut-down switch
Y1. Loading solenoid valve
Y2. Solenoid valve, modulating control (optional)
1X1. Terminal strip
1X2. Terminal strip

Figs. 8. Electrical diagrams, GA Standard Pack

Fig. 8b. Electrical diagram, GA Standard Pack, star-delta, with transformer

General alarm LED (3-Fig. 7a) 1)

- The LED blinks in case of a shut-down (due to either too high a compressor element outlet temperature or overload of the compressor motor); at the same time the shut-down screen appears. Remedy; see section 6. After eliminating the cause of the trouble and when the abnormal condition has disappeared, press key <<Rset>> (5).
- The LED blinks and the compressor is shut down if the sensor of the compressor element (TT11) is out of order; at the same time the display will show a fault message. Switch off the voltage, depressurize and check the sensor and its wiring.
- The LED is alight in case of a shut-down warning; at the same time a warning message appears. Remedy; see section 6.
- The LED is alight if the dewpoint sensor (TT90) is out of order (on Full-feature compressors); at the same time a fault message is shown. Stop the compressor, switch off the voltage, depressurize and check the sensor and its wiring.



Gp. Gauge indicating the working pressure
P1. Hourmeter indicating the total motor running time
S1. Switch to start or stop the compressor
TSHH11. Gauge/switch, indicating the temperature at the outlet of the compressor element as well as the shut-down temperature; the regulator then stops the compressor
1. Pictograph, working pressure
2. Pictograph, outlet temperature of compressor element
3. Pictograph, running hours
4. Pictograph, compressor stop
5. Pictograph, compressor start

Fig. 9. Control panel of GA Standard Pack

Selecting a menu

To facilitate controlling the compressor, menu-driven programs are implemented in the electronic module. Use the function keys (5) to select the menus in order to program and monitor the compressor. The "User manual for electronic regulator for GA5 up to GA45 compressors" deals elaborately with all regulator functions.

Function keys

Abbreviation	Designation	Function
Add	Add	To add compressor start/stop commands (day/hour)
Canc	Cancel	To cancel a programmed setting when programming parameters
Del	Delete	To delete compressor start/stop commands
Lim	Limits	To show limits for a programmable setting
List	List	To list programmed start/stop commands (day/hour)
Load	Load	To load the compressor manually
Main	Main	To return from a menu to the main display (Fig. 7b)
Menu	Menu	Starting from the main display (Fig. 7b), to initiate the main menu (Fig. 7c) which gives access to submenus Starting from a submenu, to return to the main menu (Fig. 7c)
Mod	Modify	To modify programmable settings
More	More	To have a quick look at the compressor status
Prog	Program	To program modified settings
Rset	Reset	To reset a timer or message
Rtrn	Return	To return to a previously shown option or menu
Slct	Select	To select a submenu or to read more details of a selection shown on display
Unld	Unload	To unload the compressor manually

1.5 Electrical system for GA Standard Pack

The system comprises:
1. Compressor motor (M1-Fig. 3a)
2. Regulator (Fig. 5b)
3. Control panel with start/stop switch (S1-Fig. 9)
4. Temperature shut-down switch (TSHH11-Fig. 9)
5. Load/unload pressure switch (PSR19-Fig. 14)

1) Consult the User manual for the electronic regulator, section "Status data submenu".

1.5.1 Regulator (Fig. 5b)

The regulator loads, unloads, stops and restarts the compressor according to the air consumption, and protects the compressor and motor from overloads. The unloading and loading pressures are the opening and closing pressures respectively of switch (PSR19). See section 5.8.

Delayed motor stopping
The time relay for delayed motor stopping (K26) limits the frequency of automatic motor starts by stopping the motor only after a set time of 5 minutes of uninterrupted unloaded operation. If the net pressure drops to the loading pressure within the set unloading time, the compressor will be loaded without stopping.

Compressor temperature shut-down switch (TSHH11)
The switch prevents damage resulting from too high a temperature at the outlet of the compressor element.

Motor overload relay (F21)
The relay prevents damage resulting from too high a motor current.

1.5.2 Control panel (Fig. 9)

Gp.	Gauge indicating the working pressure
P1.	Hourmeter indicating the total motor running time
S1.	Switch to start or stop the compressor
TSHH11.	Gauge/switch, indicating the temperature at the outlet of the compressor element as well as the shut-down temperature; the regulator then stops the compressor
1.	Pictograph, working pressure
2.	Pictograph, outlet temperature of compressor element
3.	Pictograph, running hours
4.	Pictograph, compressor stop
5.	Pictograph, compressor start

1.6 Air dryer on GA Full-feature (Fig. 4)

GA Full-feature are provided with a dryer which removes moisture from the compressed air. See Fig. 6b for the electrical diagram.

1.6.1 Compressed air circuit

Compressed air enters heat exchanger (5) and is cooled by the outgoing, cold, dried air. Water in the incoming air starts to condense. The air then flows through heat exchanger (6) where the refrigerant evaporates and withdraws heat from the air. This cools the air to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through moisture trap (MT) where all the condensate is separated from the air. The condensate is automatically drained through outlet (Da). The cold dried air then flows through heat exchanger (5), where it is warmed up by the incoming air.

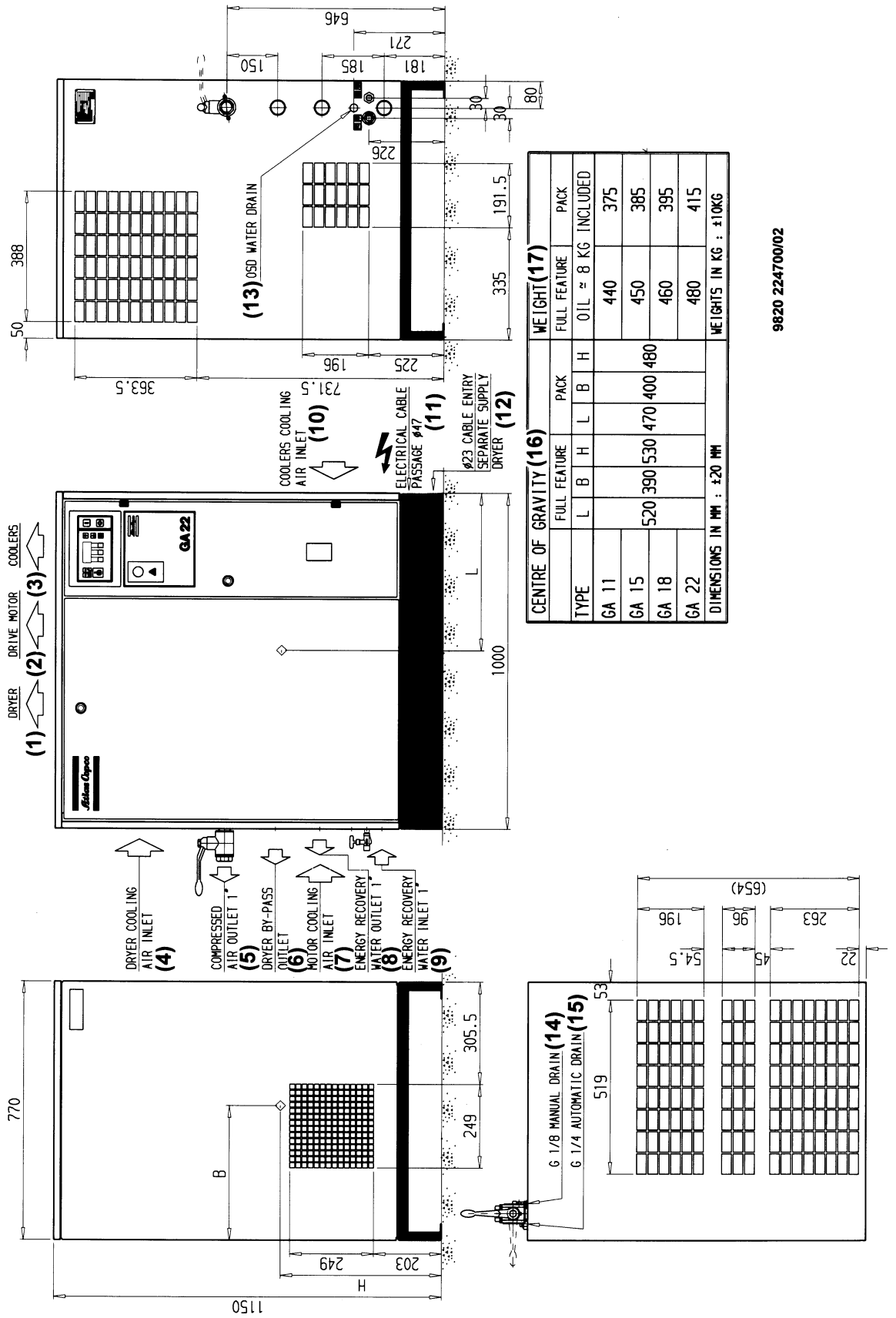
1.6.2 Refrigerant circuit

Compressor (M1) delivers high-pressure refrigerant gas which flows via liquid separator (7) through condenser (8) where most of the refrigerant condenses. The cooled refrigerant then collects in receiver (9).

The liquid flows to expansion valve (4) where it expands to evaporating pressure. The refrigerant enters evaporator (6) where it withdraws heat from the compressed air by further evaporation. The vapour refrigerant leaving evaporator (6) flows into liquid separator (7) and is sucked in by compressor (M1).

2 INSTALLATION

2.1 Dimension drawings (Figs. 10)



CENTRE OF GRAVITY (16) / WEIGHT (17)

TYPE	FULL FEATURE L	FULL FEATURE B	FULL FEATURE H	PACK L	PACK B	PACK H	FULL FEATURE OIL ≈ 8 KG INCLUDED	PACK
GA 11	520	390	530	470	400	480	440	375
GA 15							450	385
GA 18							460	395
GA 22							480	415
DIMENSIONS IN MM : ±20 MM							WEIGHTS IN KG : ±10KG	

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Fig. 10a. Dimension drawing for GA Pack and Full-feature

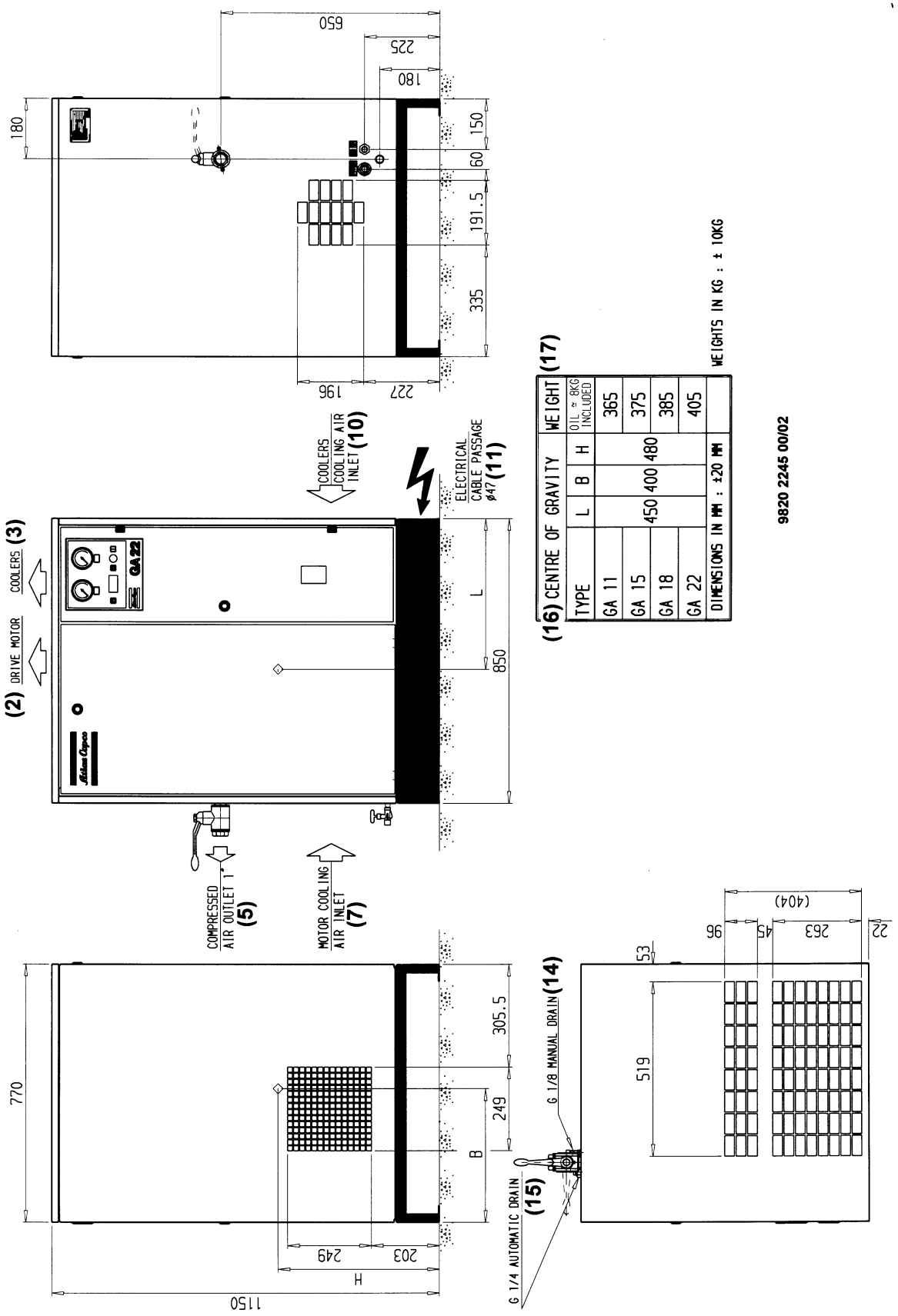


Fig. 10b. Dimension drawing for GA Standard Pack

2.2 Electric cable size, settings of overload relay (F21) and main fuses

Attention

- Local regulations remain applicable if they are stricter than the values proposed below.
- The voltage drop must not exceed 5 % of the nominal voltage. It may be necessary to use cables with a larger section than those stated to comply with this requirement.
- Max. cable length = 25 m, max. ambient temperature = 40 C, cables in free air or in raceway, copper conductors.

2.2.1 Electric cable size 1)

Frequency (Hz)	Supply voltage (V)	Cable size (mm^2 or AWG) GA11	GA15	GA18	GA22
Star-delta starter					
50	3 x 230	10/16	16/16	25/25	35/35
50	3 x 400	4/6	6/10	10/16	10/16
50	3 x 500	4/4	6/6	6/10	10/10
60	3 x 220/230	10/16	16/25	25/35	35/35
60	3 x 380	4/6	10/10	10/16	16/16
60	3 x 440/460	4/6	6/10	10/10	10/16
Direct-on-line starter					
60	3 x 220/230	AWG6/4	AWG4/4	AWG4/3	AWG3/2
60	3 x 440/460	AWG10/8	AWG8/6	AWG8/6	AWG6/6
60	3 x 575	AWG10/10	AWG10/8	AWG8/6	AWG8/6

2.2.2 Setting of motor overload relay and fuse value 2)

For star-delta starter 3)

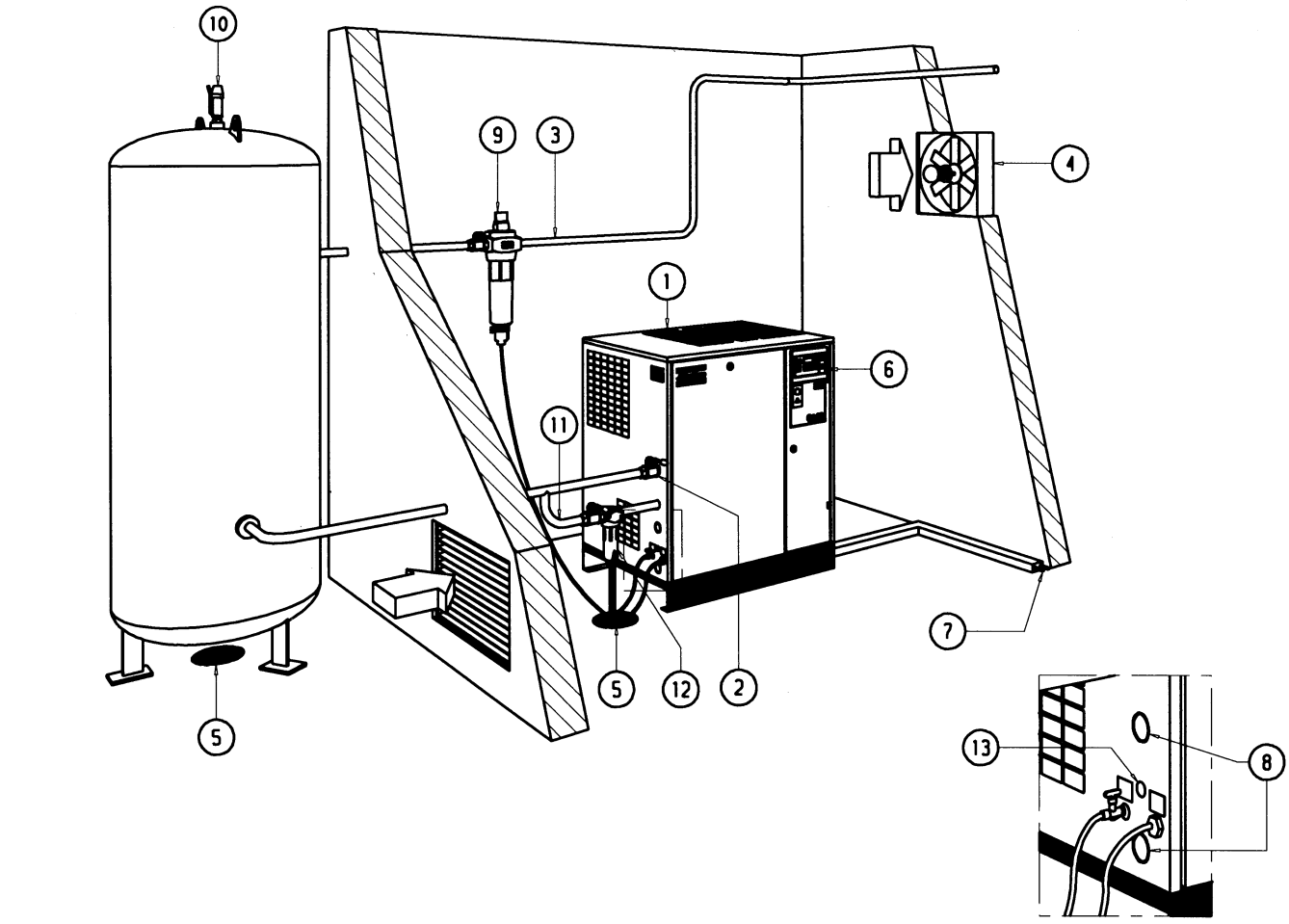
Voltage	GA11 Relay	GA11 Fuse	GA15 Relay	GA15 Fuse	GA18 Relay	GA18 Fuse	GA22 Relay	GA22 Fuse	Unit
230	26/-	63/-	35/-	80/-	43/-	100/-	48/-	100/-	A
220-230	-/26	-/63	-/37	-/80	-/43	-/100	-/50	-/100	A
380	-/15	-/35	-/21	-/50	-/25	-/63	-/29	-/63	A
400	15/-	35/-	20/-	50/-	25/-	63/-	28/-	63/-	A
440-460	-/13	-/35	-/19	-/50	-/22	-/50	-/25	-/63	A
500	12/-	25/-	16/-	35/-	20/-	35/-	22/-	50/-	A

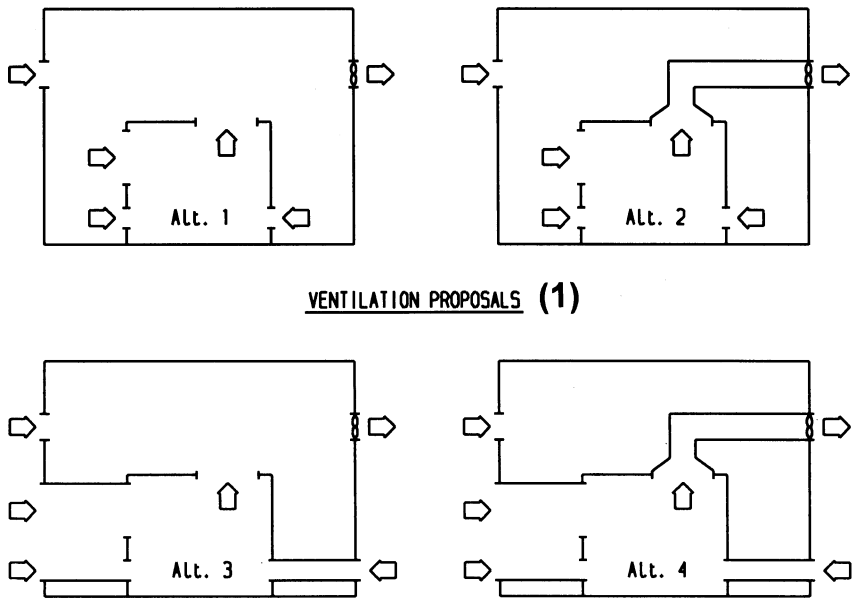
For direct-on-line starter (60 Hz) 4)

Voltage	GA11 Relay	GA11 Fuse	GA15 Relay	GA15 Fuse	GA18 Relay	GA18 Fuse	GA22 Relay	GA22 Fuse	Unit
220-230	45	80/70	64	125/125	75	150/150	87	200/175	A
440-460	23	60/60	32	80/70	37	80/70	43	80/70	A
575	17	60/60	25	60/60	29	80/70	33	80/70	A

1) Figures before the slant apply to Standard Pack, figures behind it apply to Pack and Full-feature.
2) The indicated value is the maximum fuse value with regard to short circuit protection of the starter. The cable size of the used supply cables may impose fuses of a lower value.
3) Figures before the slant apply to 50 Hz compressors, figures behind it apply to 60 Hz compressors.
4) Figures before the slant apply to CSA HRC fuses, figures behind it apply to UL class K5 fuses.

2.3 Installation proposals (Figs. 11)





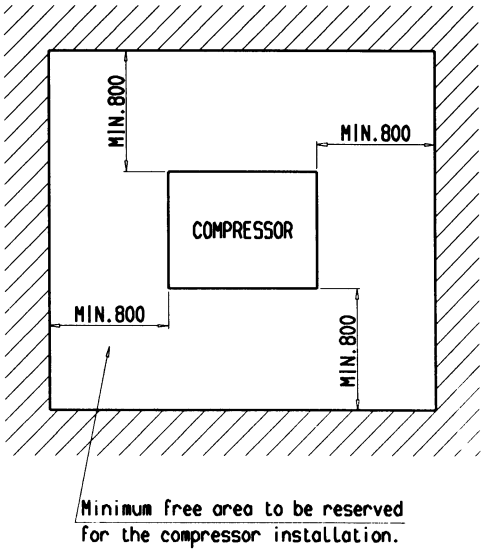


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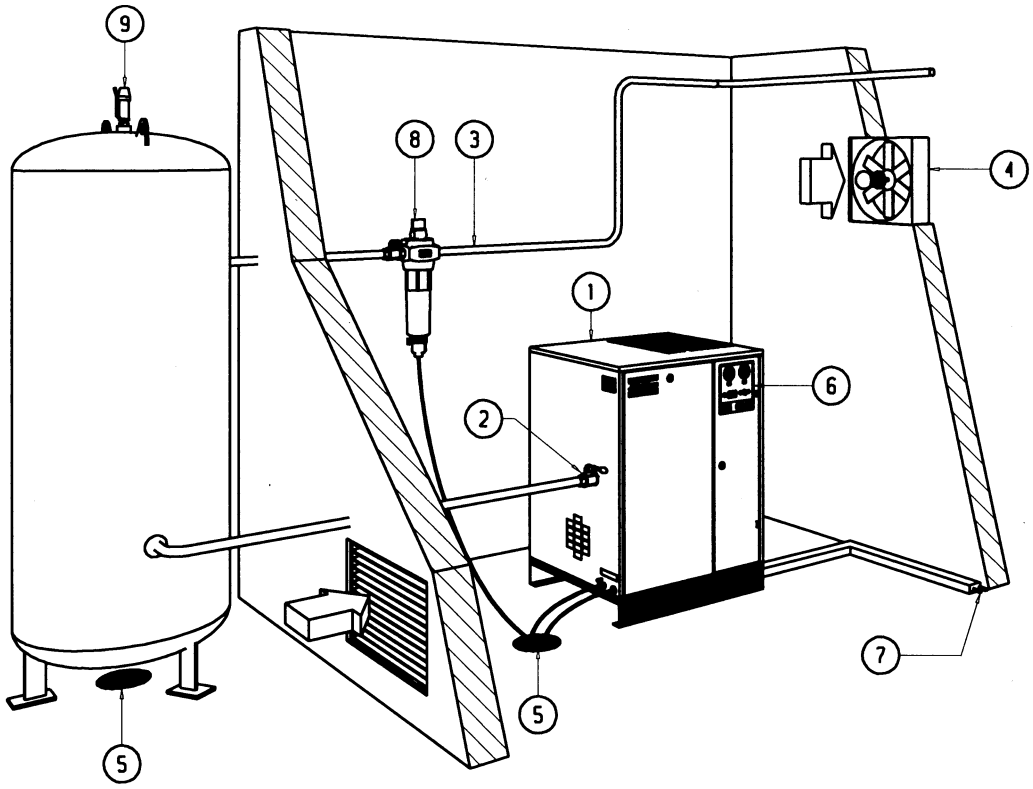
Fig. 11a. Installation proposal for GA Pack and Full-feature



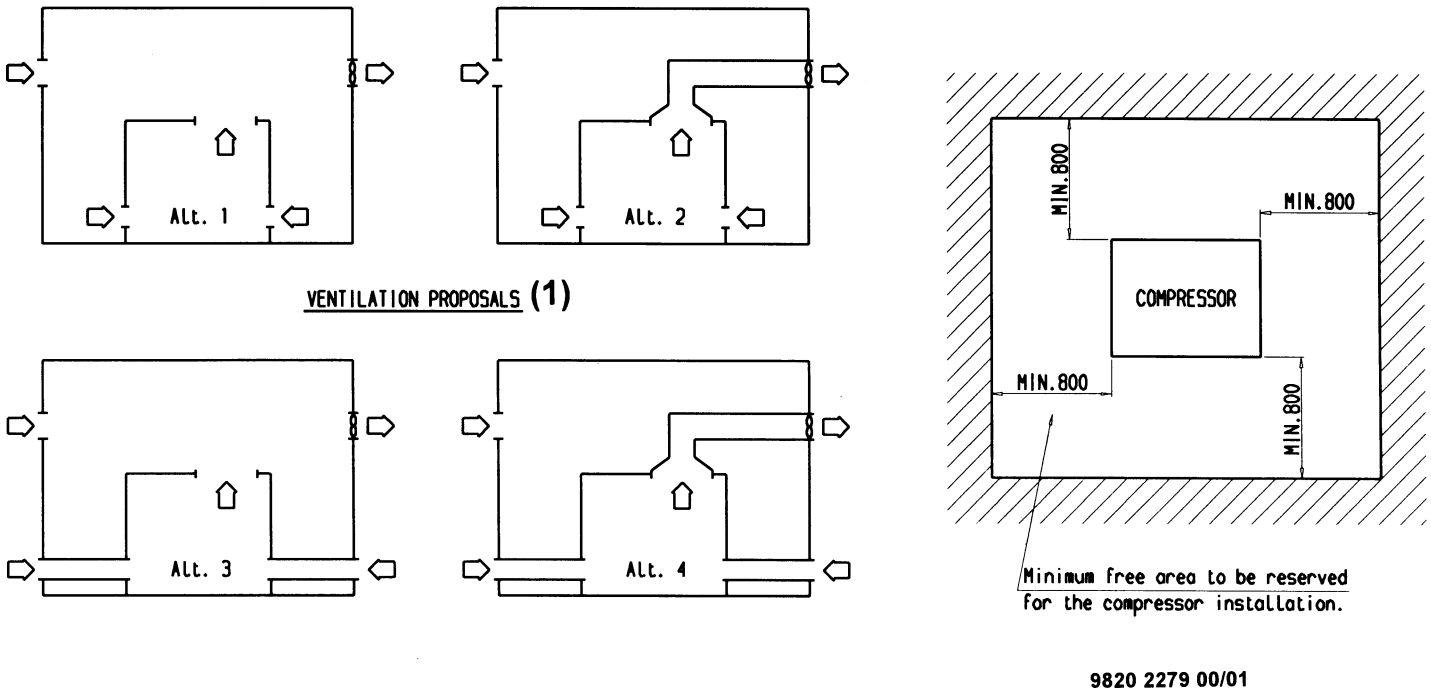


Fig. 11b. Installation proposal for GA Standard Pack

Ref. Description/recommendation

1 Install the compressor on a level floor suitable for taking the weight of the compressor, and with a minimum clearance of 1.2 m above the unit except for ventilation proposals 2 and 4.

2 Position of compressed air outlet valve.

3 The maximum total pipe length (including interconnecting piping between compressor and receiver) can be calculated as follows:

$$L = \frac{\Delta P \times d^5 \times P}{450 \times Qc^{1.85}}$$

L = pipe length in m
ΔP = maximum allowable pressure drop (recommended 0.1 bar)
d = inner diameter of pipe in mm
P = compressor outlet pressure in bar absolute
Qc = free air delivery of compressor in l/s

4 Ventilation: the inlet grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor or dryer is avoided. The air velocity to the grids must be limited to 5 m/s. The maximum allowable pressure drop over the cooling air ducts is 30 Pa. If this pressure drop is exceeded, a fan is needed at the outlet of the cooling air ducts. The maximum air temperature at the compressor intake opening is 40 C (minimum 0 C).

The required ventilation to limit the compressor room temperature can be calculated as follows:

For alternatives 1 and 3: $Qv = 0.92\ N/\Delta T$

Qv = required ventilation capacity in m^3/s
N = shaft input of compressor in kW
ΔT = temperature increase in compressor room

For alternatives 2 and 4, the fan capacity should match the compressor fan capacity at a pressure head equal to the pressure drop caused by the cooling air outlet ducts.

5 Position of condensate drain flexibles. The flexibles towards the drain collector must not dip into the water of the drain collector. Atlas Copco has oil separators (type OSD) to separate the major part of oil from condensate to ensure that the condensate meets the requirements of the environmental codes (see also reference 13 below)

6 Position of control panel.

7 Position of mains cables entry. See section 2.2 for the recommended electric cables. See section 2.4 for connecting the power supply.

For Standard Pack also (Fig. 11b):

8 Optional filters can be installed in the pressure line downstream of the outlet valve:
- A DD filter for general-purpose filtration (filter traps solid particles down to 1 micron with max. oil carry-over of 0.5 mg/m).
- A high-efficiency PD filter (traps solid particles down to 0.01 micron with max. oil carry-over of 0.01 mg/m). A PD filter must be installed downstream of a DD filter.
- If oil vapour and odours are undesirable, a filter of the QD type should be installed downstream of the PD filter.

9 Position of receiver safety valve

- A condensate trap is available as option

- The air receiver (optional) should be installed in a frost-free room and on a level concrete foundation.

For normal air consumption, the volume of the air net (receiver and piping) can be calculated as follows:

$$V = \frac{7.5 \times Q \times P}{\Delta P}$$

V = volume of air net in l
Q = free air delivery of compressor in l/s
P = compressor air inlet pressure in bar absolute
ΔP = Punload - Pload in bar

For Pack and Full-feature also (Fig. 11a):

8 Provision for energy recovery system

9 Optional filters can be installed in the pressure line downstream of the outlet valve, see reference 8 above.

10 Position of receiver safety valve

11 Dryer by-pass pipe, to be used to by-pass the dryer in case of servicing the dryer. Consult Atlas Copco.

12 Optional condensate trap and valve, can be used during servicing of the dryer. Consult Atlas Copco.

13 Provision for oil separation system (Atlas Copco OSD-type oil separator). Consult Atlas Copco.

- The air receiver (optional) should be installed in a frost-free room and on a level concrete foundation.

For normal air consumption, the volume of the air net (receiver and piping) can be calculated as described above.

2.4 Electrical connections

General

- The installation must include an isolating switch near to and visible from the compressor. **Make sure that this switch is open to isolate the compressor from the mains before carrying out any connection**.
- See section 2.2 for the size of the electric cables.
- **The installation must be earthed** and protected against short circuits by fuses of the inert type in each phase. See section 2.2.
- The electrical connections must correspond to the local codes.
- The indications on the data plate of the drive motor must correspond to the mains supply voltage and frequency.
- Check the fuses and the setting of the overload relay. See section 2.2.
- Lay-out the power supply cables under the compressor frame and then through the bottom of the electric cabinet via a 90 elbow (is delivered loose).

On GA Standard Pack

Connect the power supply to terminals (L1, L2 and L3) of terminal strip (1X2-Fig. 5b).
For compressors with voltage transformer, check that the connections at the primary side of the transformer correspond to the mains voltage.
For compressors without voltage transformer, check the connection of wire (2):

- either towards the neutral terminal (N) in case of a 3 x 400 V plus neutral mains; connect the neutral conductor to terminal (N).
- or towards terminal (2) of fuse F2 in case of a 3 x 230 V mains

On GA Pack

Connect the power supply to terminals (L1, L2 and L3) of terminal strip (1X2-Fig. 5a). Connect the neutral conductor to terminal (N). Consult section 2.2.

On GA Full-feature

- Connect the power supply to terminals (L1, L2 and L3) of terminal strip (1X2-Fig. 5a). Connect the neutral conductor to terminal (N). Consult section 2.2.
- The voltage to the dryer is supplied over the contacts of relay (K11-Fig. 5a), which close when the compressor is started.
- **The voltage supply to the dryer must be single-phase 230 V.** The voltage may be branched off directly from the mains supply or via an optional voltage transformer.

1. **The dryer voltage supply is branched off from the mains supply**

   - **For a compressor supply voltage of 3 x 400 V plus neutral conductor** (A-Fig. 12):
     The dryer supply voltage is branched off between a phase conductor and the neutral conductor.
   - **For a compressor supply voltage of 3 x 230 V** (B-Fig. 12):
     The dryer supply voltage is branched off between two phase conductors.
   - **For all other supply voltages** (C-Fig. 12):
     A separate single-phase 230 V voltage supply must be provided. Use wiring of minimum 1.5 mm . The dryer must be protected by fuses of 10 A (except for 60 Hz CSA/UL: 8 A for GA11/15 and 12 A for GA18/22).

2. **The dryer voltage is branched off from the optional voltage transformer**
   The correct connections are shown on diagram D-Fig. 12.

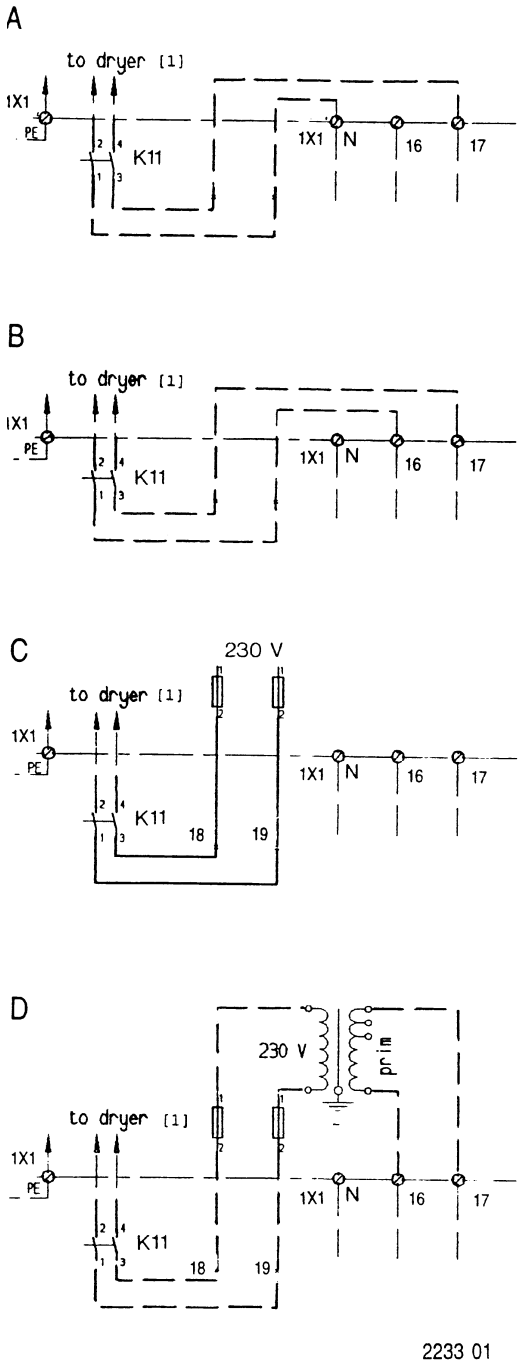
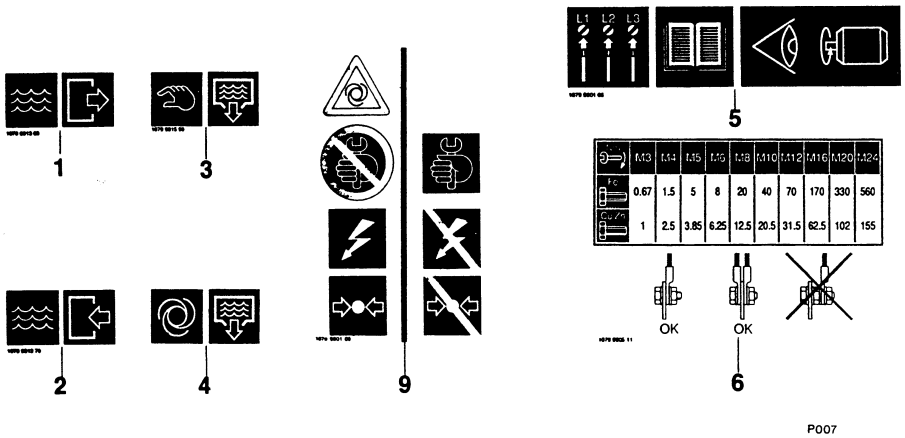
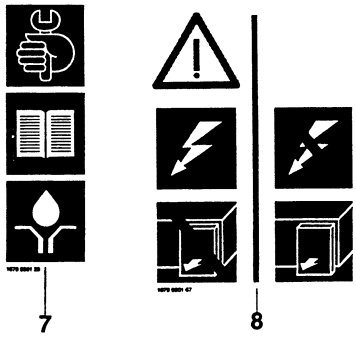


Fig. 12. Dryer connections on GA Full-feature

2.5 Pictographs

Fig. 13 shows typical examples of pictographs used for GA compressors. See also Fig. 9.





1. Water outlet
2. Water inlet
3. Manual condensate drain
4. Automatic condensate drain
5. Before connecting compressor electrically, consult instruction book for motor rotation direction
6. Torques for steel (Fe) or brass (CuZn) bolts
7. Consult Instruction book before greasing
8. Switch off voltage before removing protecting cover inside electric cubicle
9. Switch off voltage and depressurize compressor before repairing

Fig. 13. Pictographs

3 OPERATING INSTRUCTIONS

3.1 Before initial start-up

3.1.1 Safety precautions

The operator must apply all relevant safety precautions, including those mentioned in this book.

3.1.2 User manual (GA Pack / Full-feature only)

Read the "User manual for electronic regulator for GA5 up to GA45 compressors" to familiarize yourself with all regulator functions.

3.1.3 Outdoor/altitude operation

If the compressor is installed outdoors or if the air inlet temperature can be below 0°C (32°F), precautions must be taken. In this case, and also if operating at high altitude, consult Atlas Copco.

3.1.4 Handling

The bottom frame of the compressor is designed for easy handling with a pallet truck. The compressor can pass through a standard door (width 800 mm)

3.1.5 External compressor status indication (GA Pack / Full-feature only)

A relay box for external compressor status indication (E2-Fig. 5a) is available as option. It can be connected to the electronic control module (E1). The relay box has relays for indication of:

- manual load/unload or automatic operation (K06)
- warning condition (K07)
- shut-down condition (K08)

Maximum load for these contacts: 1 A / 240 VAC. Stop the compressor and switch off the voltage before connecting external equipment.

3.1.6 Compressor control modes (GA Pack / Full-feature only)

The electronic regulator has two switches (CMS1/2-Fig. 5a) on strip (1X1) to select following compressor control modes (0 = open / 1 = closed):

CMS1	CMS2	Compressor mode
0	0	Compressor off
1	0	Compressor in local control mode (remote control is made inactive).
0 1	1 or 1	Compressor in remote control mode (local control is made inactive). **For remote starting and stopping:** Connect one side of a remote start button (normally open contact) to terminal 3 of connector (2X4) **1)**. Connect one side of a remote stop button (normally closed contact) to terminal 4 of connector (2X4) **1)**. Bridge the other sides of these buttons. Connect this common joint to terminal 2 of connector (2X4). Bridge terminal 28 of strip (1X1-Fig. 5a) and terminal 6 of connector (2X4) **1)**. In this mode, the outlet pressure is still sensed by pressure transducer (PT20), resulting in loading and unloading of the compressor at the pressures programmed in the electronic regulator. If terminals 28 and 6 are not bridged, the compressor is switched out of automatic load/unload operation and remains running unloaded. **For remote loading/unloading (via external pressure switch):** Bridge terminal 28 of strip (1X1-Fig. 5a) and terminal 7 of connector (2X4) **1)** and connect a load/unload switch between terminal 28 of strip (1X1-Fig. 5a) and terminal 6 of connector (2X4) **1)**. This results in loading and unloading of the compressor at the closing and opening pressures of the external pressure switch respectively.

Have the modifications checked by Atlas Copco. Stop the compressor and switch off the voltage before connecting external equipment. Only voltage-free contacts are allowed.

3.2 Initial start-up

1. Remove the transport bolts and spacers (6-Figs. 2 and 3).

   Attention:
   If the compressor is installed on a ship, **do not remove** the transport spacers. The maximum angular deviation is 22° in any direction. Consult Atlas Copco.

2. Check that the electrical connections correspond to the local codes and that all wires are clamped tight to their terminals. See section 2.4.

1) At the back of the electronic module.

3. Check the voltage selecting wires at the primary side of transformer (T1-Fig. 5a) **1)**, the setting of compressor motor overload relay (F21), and that overload relay (F21) is set for automatic resetting.
4. Fit air outlet valve (AV-Figs. 2 and 3). Close the valve. Connect the air net to the valve.
5. Fit valve (Dm1-Fig. 2a). Close the valve. Connect the valve to a drain collector. **2)**
6. Connect the automatic drain outlet (Da-Fig. 2a) to a drain collector. **2)**
7. The drain pipes to the drain collector must not dip into the water. For draining of pure condensate water, install an oil/water separator which is available from Atlas Copco as option. If the pipes have been led down outside the room where freezing is possible, they must be insulated.
8. Check the oil level. The pointer of level indicator (GI-Figs. 2 and 3) should register in the green range or above it.
9. Stickers dealing in short with the operating instructions and explaining the pictographs are delivered with the literature set. Affix the stickers next to the control panel. Make yourself familiar with the instructions and pictographs explained, as well as with those mentioned in section 2.5.
10. Check the motor (M1-Figs. 2 and 3) for correct direction of rotation. The rotation direction can be checked through the grating of the compressor cooling fan. See Fig. 2b. The direction is indicated by an arrow (10) stuck on the fan (FN).
    The correct direction of rotation of the motor is counter-clockwise when facing the cooling fan.
    Switch off the voltage and reverse two of the voltage supply lines if the direction of rotation is wrong.
11. On GA Pack / Full-feature, check the programmed settings. **3)**
12. Start and run the compressor for a few minutes. Check that the compressor operates normally.

3.3 Starting

For GA Pack / Full-feature (Fig. 7a)

1. Check the oil level: the pointer of level indicator (GI-Fig. 2b) should register in the green range or above it.
2. Switch on the voltage. Check that voltage on LED (2) lights up. The message <<compressor off>> appears.
3. If the red part of service indicator (VI-Fig. 2a) shows completely red, replace the air filter (AF-Fig. 2a).
4. Close condensate drain valve (Dm1-Fig. 2a).
5. Open air outlet valve (AV-Fig. 2a).
6. Press start button I (8). The compressor starts running and automatic operation LED (1) lights up. Ten seconds **4)** after starting, the compressor motor switches over from star to delta. At the same time **4)** the compressor starts running loaded. The message on display (4) changes from <<Auto unloaded>> to <<Auto loaded>>.

For GA Standard Pack

1. Check the oil level: the pointer of level indicator (GI-Fig. 3b) should register in the green range or above it.
2. Switch on the voltage.
3. If the red part of service indicator (VI-Fig. 3a) shows completely red, replace the air filter (AF-Fig. 3b).
4. If installed, close the condensate drain valve. **2)**
5. Open air outlet valve (AV-Fig. 3a).
6. Move switch (S1-Fig. 9) to "I".

3.4 During operation

1. Check the oil level **during loaded operation**: the pointer of level indicator (GI-Figs. 2 and 3) must be in the green range.
   For GA Pack / Full-feature (Fig. 7a)
2. If automatic operation LED (1) is alight, the regulator is automatically controlling the compressor, i.e. loading, unloading, stopping of the motors and restarting.

3.4.1 Checking the display (GA Pack / Full-feature only) 5)

1. Regularly check the display for readings and messages. Normally the main display (Fig. 7b) is shown, indicating the compressor outlet pressure, the status of the compressor and the abbreviations of the functions of the keys below the display. See section 1.4.
2. Always check the display (4) and remedy the trouble if alarm LED (3) is alight or blinks. See section 1.4.
3. The display (4) will show a service message if one of the monitored components is to be serviced; replace the component and reset the relevant timer.
   Notes:
   - Whenever a shut-down, shut-down warning, service request, sensor error or motor overload message is displayed, the free spaces on the display between the function keys (5) are filled with blinking indicators (**).
   - When more than one message needs to be displayed (e.g. both warning and service), the messages will be displayed one after the other for 3 seconds.

4. Regularly press the key <<More>> (5) **6)** to call up information about the actual compressor condition:
   - the status of controlling the compressor (automatic or manual, local or remote)
   - the status of the compressor start/stop timer (on or off) **7)**

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1) For GA Standard Pack: if a transformer is provided.
2) An automatic drain system for GA Standard Pack is available as option.
3) Consult the User manual for the electronic regulator, sections regarding the submenus "Measured data", "Service", "Modify settings", "Timer" and "Programmable settings".
4) Programmable. See the User manual for the electronic regulator, section "Programmable settings".
5) Consult the User manual for the electronic regulator, sections "Status data submenu" and "Service submenu".
6) If the <<More>> function is not indicated on the bottom line of display (4-Fig. 7a), press key <<Menu>> (5) until function <<Main>> appears above key (F1), then press the key <<Main>>.
7) The compressor is automatically started and stopped if these start/stop commands are programmed and activated; consult the User manual for the electronic regulator, section "Timer submenu".

- the maximum allowable unloading pressure
- the outlet pressure
- the compressor element outlet temperature
- the dewpoint temperature (on Full-feature compressors)
- the status of the motor overload protection (normal or not)
- the total running and loading hours

3.5 Manual control for GA Pack / Full-feature (Fig. 7a) 1)

Normally, the compressor runs in automatic operation, i.e. the electronic regulator loads, unloads, stops and restarts the compressor automatically. LED (1) is then alight.

If required, the compressor can be unloaded manually. In this case, the compressor is switched out of automatic operation, i.e. the compressor remains running unloaded unless it is loaded again manually.

Manually unloading
Press the key <<Unld>> (unload) (5). LED (1) goes out. The message <<Manual Unloaded>> appears on the display.

Manually loading
Press the key <<Load>> (5). LED (1) lights up. The command <<Load>> does not force the compressor in loaded condition, but it will switch the compressor to automatic operation again, i.e. the compressor will be loaded if required by the air net pressure.

Manually starting/number of motor starts
In automatic operation, the regulator limits the number of motor starts. If the compressor is stopped manually, it must not be restarted within 5 minutes.

3.6 Stopping

For GA Pack / Full-feature (Fig. 7a)
1. Press stop button O (9). LED (1) goes out. The message <<Programmed stop>> appears. The compressor runs unloaded for 30 seconds and then stops.
2. **To stop the compressor in case of emergency,** press button (S3). Alarm LED (3) blinks. After remedying the fault, unlock the button by turning it anticlockwise and press key <<Rset>> (5) before restarting. The message <<All conditions are OK>> appears. Press keys <<Menu>> and <<Main>>.
3. Close air outlet valve (AV-Fig. 2a) and switch off the voltage.
4. Open condensate drain valve (Dm1-Fig. 2a).

For GA Standard Pack
1. Move switch (S1-Fig. 9) to position "O".
2. Close air outlet valve (AV-Fig. 3a) and switch off the voltage.
3. If installed, open the condensate drain valve. **2)**

3.7 Taking out of operation at end of compressor service life

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Depressurize the compressor by opening plug (FC-Figs. 2 and 3) one turn and opening valve (Dm1-Fig. 2a). **2)**
4. Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
5. Drain the oil (DP1/DP2-Figs. 2 and 3) and condensate circuits (Dm1-Fig. 2a). **2)**
6. Disconnect the compressor condensate piping (Da/Dm1-Fig. 2a) from the local condensate drain system. **2)**

4 MAINTENANCE

Attention
Before starting any maintenance:

1. Stop the compressor:
   - On GA Standard Pack, move switch (S1-Fig. 9) to "O"
   - On GA Pack / Full-feature, press button O (9-Fig. 7a), wait until the compressor has stopped (approx. 30 seconds) and press button (S3-Fig. 7a).
2. Switch off the voltage. If a separate voltage supply is provided for the dryer of GA Full-feature (see section 2.4), make sure that the voltage to the dryer is also switched off.
3. Close air outlet valve (AV-Figs. 2 and 3) and depressurize the air system.
4. Apply all relevant safety precautions, including those mentioned in this book.

The air outlet valve (AV-Figs. 2 and 3) can be locked during maintenance or repair as follows:
- Close the valve.
- Remove the bolt fixing the handle.
- Lift the handle and turn it until the slot of the handle fits over the blocking edge on the valve body.
- Lock the handle using the special bolt and wrench delivered loose with the compressor.

4.1 Compressor motor (M1-Figs. 2 and 3)

The motor bearings are greased for life.

1) If the <<Load>> or <<Unld>> (unload) function is not indicated on the bottom line of display (4), press key <<Menu>> (5) until the function <<Main>> appears above key (F1), then press the key <<Main>>.
2) A condensate drain system is available as option for GA Standard Pack.

4.2 Preventive maintenance schedule for the compressor 1)

Attention
For overhauling or carrying out preventive maintenance, service kits are available. See section 4.7. Atlas Copco offers several types of Service contracts, relieving you of all preventive maintenance work. For more details, consult your nearest Atlas Copco representative.

The schedule comprises a summary of the maintenance instructions. **Read the respective section before taking maintenance measures. The "longer interval" checks must also include the "shorter interval" checks.** When servicing, replace all disengaged packings, e.g. gaskets, O-rings, washers.

Period 2)	Running hours 2)	See section	See note	Operation
Daily				**Before starting**
▪	--	3.3	--	Check oil level
				During operation
▪	8	3.4/7.1	--	Check readings on display or gauges
▪	8	--	11/13	Check that condensate is discharged during loading (Da)
▪	8	3.4	--	Check oil level (Gl)
				After stopping
▪	--	3.6	13	Drain condensate (Dm1)
3-monthly	--	5.3	--	Operate safety valve (SV)
▪	--	--	9	Carry out a LED/display test (not on GA Standard Pack)
▪	--	--	8	Check for possible leaks
▪	--	--	--	Check condition of belts
"	500	5.2	1/8	Inspect coolers (Ca/Co); clean if necessary
▪	500	--	1/7	Remove air filter element (AF), inspect
6-monthly	--	--	1	**On GA Full-feature,** brush or blow off the finned surface of condenser
Yearly	--	5.3	--	Have safety valve tested
▪	--	--	--	Have operation of electrical components tested
▪	--	--	10	Test temperature shut-down protection
▪	2000	--	13	Remove, dismantle and clean float valve of moisture trap (MT)
▪	4000	4.4/4.5	2/6	Replace oil filter (OF)
▪	4000	4.4/4.5	3/5/6	If Roto-injectfluid is used, change oil
▪	4000	5.1	6	Replace air filter (AF)
				For 13 bar and 175 psi compressors
▪	500	4.4/4.5/4.6	2/6	If oil as specified in section 4.4.2 is used, change oil and oil filter (OF)
				For 7 bar, 10 bar, 100 psi, 125 psi and 150 psi compressors
▪	1000	4.4/4.5/4.6	2/6	If oil as specified in section 4.4.2 is used, change oil and oil filter (OF)
▪	--	--	4	Have all flexibles inspected
▪	--	2.5	--	Switch off voltage. Check terminals in electric cabinet for tightness
--	8000	5.4	--	Replace belts
2-Yearly	8000	--	6/12	Have oil separator (OS) replaced

1) **Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.**
2) **Whichever interval comes first.** The local Sales Company may overrule the maintenance schedule, especially the service intervals, depending on the environmental and working conditions of the compressor.

Notes

1. More frequently when operating in a dusty atmosphere.
2. Use an oil filter as specified in the Parts list.
3. Special Atlas Copco oil for screw compressors keeping the compressor in excellent condition.
4. Damaged flexibles must be replaced immediately.
5. It is strongly recommended to use Atlas Copco Roto-injectfluid.
6. Consult the User manual for the electronic regulator for resetting the service timer (not for GA Standard Pack).
7. Replace the filter if damaged.
8. Any leak should be attended to immediately.
9. Consult the User Manual for the electronic regulator, section "Display test" (not for GA Standard Pack).
10. For GA Pack / Full-feature: Consult the User Manual for the electronic regulator, section "Modify settings submenu", before modifying the temperature protection settings.
    Decrease the shut-down warning level and shut-down level for the compressor element outlet temperature to the minimum settings. Run the compressor: when reaching the setting, the unit must shut down. Afterwards, reset the warning and shut-down levels to their original values.
    For GA Standard Pack, consult Atlas Copco for testing.
11. Atlas Copco has oil separators to separate the major part of the oil from the condensate to ensure that the condensate meets the requirements of the environmental codes.
12. 6000 hours in severe conditions
13. An automatic condensate drain system is available as option on GA Standard Pack.

4.3 Oil and oil filter change interval

Consult section 4.2 for the change intervals and section 4.4 for the oil specifications.

4.4 Oil specifications

It is strongly recommended to use Atlas Copco Roto-injectfluid. See below. Never mix oils of different brands or types.

4.4.1 Atlas Copco Roto-injectfluid

It is strongly recommended to use Atlas Copco Roto-injectfluid. This is special oil for screw compressors which keeps the compressor in excellent condition.

Atlas Copco Roto-injectfluid can be ordered in following quantities:

Quantity	Ordering number
5-litre can	2901 0245 01
15-litre can	2901 0086 01
25-litre can	2901 0001 01
209-litre drum	2901 0045 01

4.4.2 Mineral oil

Although Roto-injectfluid is recommended, a high-quality mineral oil with oxidation inhibitors and anti-foam and anti-wear properties can also be used after taking some precautions. The previously used oil should first be drained and the system flushed. The oil filter should be replaced. The viscosity grade must correspond to the ambient temperature and ISO 3448, as follows:

Ambient temperature	Viscosity grade	Viscosity index
Consistently above 25 C (77 F)	ISO VG 68	Minimum 95
Between 25 C (77 F) and 0 C (32 F) . . .	ISO VG 46	Minimum 95

Consult Atlas Copco for the recommended oils. Use only non-toxic oils where there is a risk of inhaling delivered air.

4.5 Oil and oil filter change

1. Run the compressor until warm. Stop it and close valve (AV-Figs. 2 and 3). Wait a few minutes. Depressurize the oil system by opening oil filler plug (FC) one turn to permit any pressure to escape.
2. Remove plug (VP-Fig. 1). Drain the oil by unscrewing plugs (DP1/DP2-Figs. 2 and 3). Collect the oil in a collector and deliver it to the local oil collection service. Reinstall the plugs.
3. Remove oil filter (OF-Figs. 2 and 3).
4. Clean the filter seat on the manifold. Oil the gasket of the new element. Screw the element into place and tighten firmly by hand.
5. Remove filler plug (FC-Figs. 2 and 3) and fill with oil until the level reaches the plug. Reinstall and tighten plug (FC).
6. Run the compressor for a few minutes. Check the level during loading: the pointer of level indicator (GI-Figs. 2 and 3) must be in the green range.
7. Reset the oil and oil filter service warning. **1)**

1) Consult the User manual for the electronic regulator, section "Service submenu" (not for GA Standard Pack).

4.6 Storage after installation

Run the compressor twice a week until warm. Load and unload the compressor a few times.

If the compressor is stored without running from time to time, protective measures must be taken. Consult Atlas Copco.

4.7 Service kits

Service kits are available offering the benefits of genuine Atlas Copco parts while keeping the maintenance budget low. The kits comprise all parts needed for servicing. Consult the Parts list for the contents of all service kits.

Service kit for	Ordering number
- oil filter and air filter	2901 0000 00
- oil separator	2901 0343 00

5 ADJUSTMENTS AND SERVICING PROCEDURES

5.1 Air filter (AF-Figs. 2 and 3)

1. Stop the compressor. Remove the air filter element. Discard damaged elements.
2. Fit the new element.
3. Reset the air filter service warning. **1)**

5.2 Coolers (Co/Ca-Fig. 1)

Keep the coolers clean to maintain the cooling efficiency.

Lift side plate (7-Fig. 1) from the bodywork after unscrewing bolts (8-Fig. 1) which are accessible through the grating above the cooler block (Ca/Co).

Remove any dirt from the coolers with a fibre brush. Never use a wire brush or metal objects. Then clean by air jet in reverse direction of normal flow. If it should be necessary to wash the coolers with a cleansing agent, consult Atlas Copco.

5.3 Safety valve (SV-Figs. 2 and 3)

Operate the safety valve by unscrewing the cap one or two turns and retightening it (or by pulling the valve lifting lever, if provided).

Testing
The valve can be tested on a separate compressed air line. If the valve does not open at the pressure marked on the valve, consult Atlas Copco. **No adjustments are allowed. Never run the compressor without safety valve.**

5.4 Belt set exchange (Fig. 14)

The belts must be replaced as a set, even if only one of them seems worn. Use Atlas Copco belts only.

1. Lift side plate (7-Fig. 1) from the bodywork after unscrewing bolts (8-Fig. 1) which are accessible through the grating above the cooler block (Ca/Co).
2. Loosen bolts (9). Unscrew bolt (5) to loosen the spring force on the belts. Bolt (5) can now be pushed inwards to facilitate taking out of the belts.
3. Loosen bolts (2) and take out support (3) together with fan duct (1).
4. Take out the belts.
5. Install new belts.
6. Fully screw in bolt (5) until bracket (7) touches bracket (8).
7. Tighten bolts (9).
8. Fit support (3) with duct (1) on the frame and tighten bolts (2) by hand. Position the support so that it fits 3 mm inside duct (4). Check that a gap of minimum 2 mm exists between duct (1) and duct (4) to allow the fan to rotate freely. Tighten bolts (2).
9. Refit side plate (7-Fig. 1).
10. Retension after 25 running hours: Loosen bolts (9). If the belt tension is insufficient, brackets (7 and 8) will come apart. In this case, fully screw in bolt (5) until bracket (7) touches bracket (8). The belt tension is now correct. Tighten bolts (9).

5.5 Fan control switch on GA Full-feature

The switch is factory-adjusted and must be replaced if the switch-on or cut-out pressure deviates from the values given in section 7.3.

5.6 High pressure shut-down switch on GA Full-feature (TÜV-approved units only)

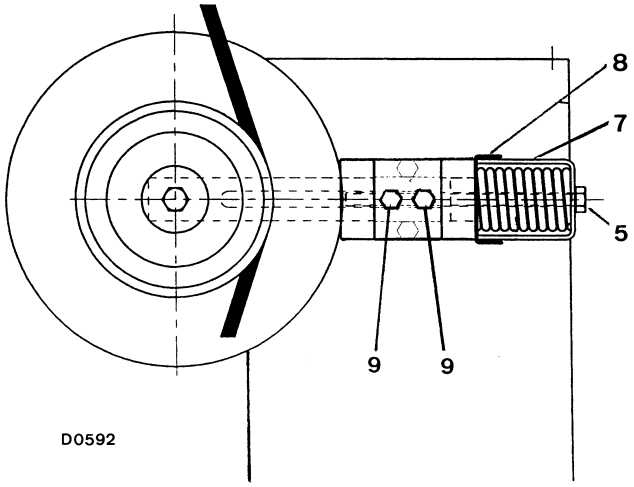
The switch is factory-adjusted and must be replaced if the shut-down value deviates from the value given in section 7.3.

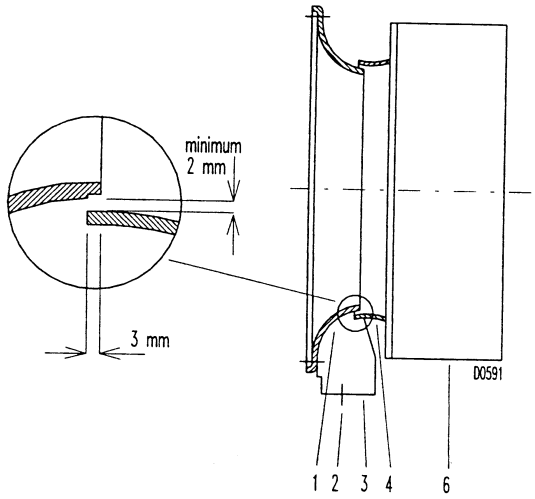
5.7 Expansion valve on GA Full-feature

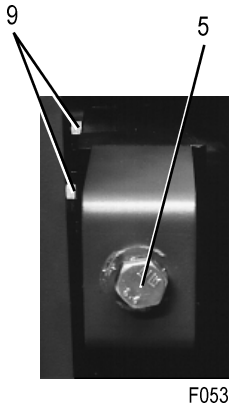
The valve is a regulator which keeps the evaporator pressure, and consequently also the temperature, stable. The valve is controlled

1) Consult the User manual for the electronic regulator, section "Service submenu" (not for GA Standard Pack).

by its own outlet pressure. The valve is factory-set to keep the effective evaporator pressure at no-load at a minimum of 2 bar (29 psi) **1)**, which corresponds to 1 C (34 F). If necessary, have the valve adjusted.







1. Fan duct
2. Bolt
3. Support
4. Duct
5. Bolt
6. Fan
7. Bracket
8. Bracket
9. Bolt

Fig. 14. Belt tensioning equipment

5.8 Load/unload pressure switch (PSR19-Figs. 3) on GA Standard Pack

The switch allows the operator to select the unloading pressure and the pressure difference between the unloading and loading pressures. The unloading and loading pressures are the opening and closing pressures of the air pressure switch.

Adjustment can only be carried out when the air pressure switch is pressurized. Remove blocking device (1-Fig. 15) before adjusting knob (2).

The unloading pressure is controlled by adjusting knob (2). Turn the knob clockwise to raise the unloading pressure, anti-clockwise to lower it.

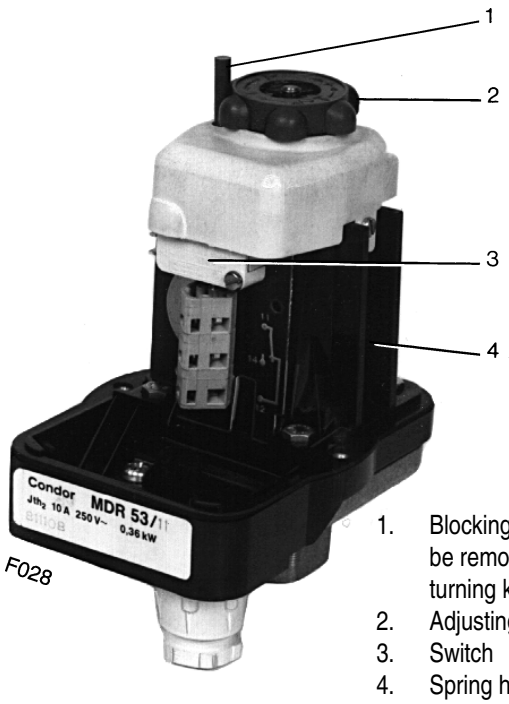
The pressure difference between unloading and loading is adjusted by means of the same knob. The adjustment range is given in Figs. 16. Push down the knob and turn it clockwise to reduce the pressure difference, anti-clockwise to increase it.

5.9 Temperature shut-down switch on GA Standard Pack

Switch (TSHH11-Fig. 9) has an adjusting screw in the centre at the back of the housing of the switch.

The reset screw is located in the centre of the indicator scale and is protected by a cap. To reset the switch after tripping, unscrew the cap and turn the reset screw with a screwdriver anti-clockwise.

1) For GA18/22 High ambient version : 4.2 bar (61 psi)



1. Blocking device (to be removed before turning knob 2)
2. Adjusting knob
3. Switch
4. Spring housing

Fig. 15. Air pressure switch (PSR19)

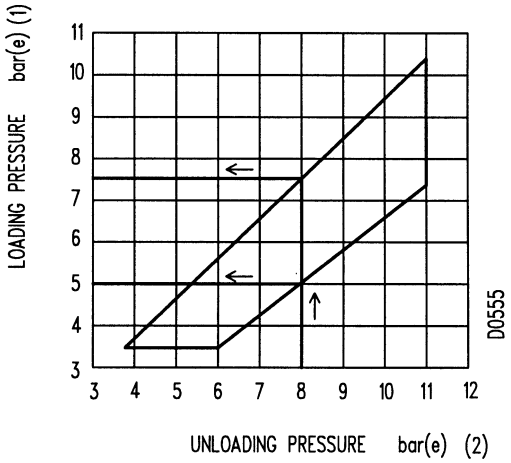


Fig. 16a. Switch MDR 53/11

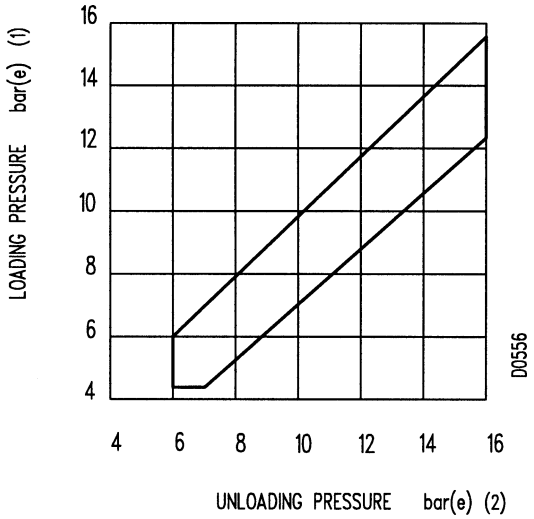


Fig. 16b. Switch MDR 53/16

Example (see Fig. 16a):

- unloading pressure(e): 8 bar
- loading pressure(e): adjustable between 5 bar and 7.6 bar

Figs. 16. Pressure difference adjustment ranges

6 PROBLEM SOLVING

Attention

- Before starting any maintenance:
  - Stop the compressor:
    On GA Standard Pack, move switch (S1-Fig. 9) to "O".
    On GA Pack / Full-feature, press button O (9-Fig. 7a), wait until the compressor has stopped (approx. 30 seconds) and press button (S3-Fig. 7a).
  - Switch off the voltage. If a separate voltage supply is provided for the dryer of GA Full-feature (see section 2.4), make sure that the voltage to the dryer is also switched off.
  - Close the air outlet valve and depressurize the air system. The outlet valve can be locked in closed position. See section 4.
  - Apply all relevant safety precautions, including those mentioned in this book.

- The chart helps to solve mechanical problems. An electrical fault must be traced by an electrician. Check that the wires are not damaged and that they are clamped tight to their terminals.

For GA Pack / Full-feature also:

- To facilitate solving some problems, a number of messages may appear on the control panel. Examples:

Message	Action
System failure 10 or 106	Switch off the voltage. Check the terminals on connector (2X1) and emergency stop button (S3) for correct connection.
System failure 11	Switch off the voltage. Check for possible connection with the ground of one of the digital inputs at connector (2X4).
System failure 104	Switch off the voltage. Check that the contacts to the digital inputs at the connectors of the module are voltage-free.

Connector (2X5) must only be used for connecting the Atlas Copco Relay expansion box (optional) which allows indication of manual/ automatic operation, warning condition or shut-down condition.

- Consult the User manual for the electronic regulator if a service message or fault message appears on the display (4-Fig. 7a) or when alarm LED (3-Fig. 7a) is alight or blinks.

Mechanical faults and suggested remedies (Fig. 4)

1. Compressor starts running, but does not load after a delay time
- a. Solenoid valve (Y1) out of order
- a. Have valve inspected
- b. Inlet valve (IV) stuck in closed position
- b. Consult Atlas Copco
- c. Leak in control air flexibles
- c. Have leak repaired
- d. Minimum pressure valve (Vp) leaking (when net is depressurized)
- d. Consult Atlas Copco

2. Compressor does not unload, safety valve blows
- a. Solenoid valve (Y1) out of order
- a. See 1a
- b. Inlet valve (IV) does not close
- b. See 1b

3. Condensate is not discharged from moisture trap 1) during loading
- a. Discharge flexible clogged
- a. Check and correct as necessary
- b. Float valve malfunctioning
- b. Consult Atlas Copco

4. Compressor air output or pressure below normal
- a. Air consumption exceeds air output of compressor
- a. Check equipment connected
- b. Choked air inlet filter element (AF)
- b. Replace filter element
- c. Solenoid valve (Y1) malfunctioning
- c. See 1a
- d. Leak in control air flexibles
- d. See 1c
- e. Inlet valve (IV) does not fully open
- e. See 1b
- f. Oil separator element (OS) clogged
- f. Have element replaced. Consult Atlas Copco
- g. Air leakage
- g. Check and correct as necessary
- h. Safety valve (SV) leaking
- h. Have valve replaced. Consult Atlas Copco
- i. Compressor element (E) out of order
- i. Consult Atlas Copco

5. Excessive oil consumption; oil carry-over through discharge line
- a. Oil level (Gl) too high
- a. Check for overfilling. Release pressure and drain oil to correct level
- b. Incorrect oil causing foam
- b. Change to correct oil
- c. Oil separator element (OS) defective
- c. Have element checked. Replace, if necessary.

6. Safety valve (SV) blows after loading
- a. Inlet valve (IV) malfunctioning
- a. See 1b
- b. Minimum pressure valve (Vp) malfunctioning
- b. See 1d
- c. Safety valve (SV) out of order
- c. See 4h
- d. For Full-feature: dryer pipes clogged by formation of ice
- d. Have refrigerant system checked. Consult Atlas Copco

7. Element outlet 2) or air outlet temperature above normal
- a. Insufficient cooling air or cooling air temperature too high
- a. Check for cooling air restriction or improve ventilation of compressor room. Avoid recirculation of cooling air. If installed, check capacity of compressor room fan
- b. Oil level too low (Gl)
- b. Check and correct as necessary
- c. Oil cooler (Co) clogged
- c. Clean cooler
- d. By-pass valve (BV) malfunctioning
- d. Have valve replaced
- e. Air cooler (Ca) clogged
- e. Clean cooler
- f. Compressor element (E) out of order
- f. See 4i

1) Available as an option on GA Standard Pack.
2) A warning message will appear on display (4-Fig. 7a) (not for GA Standard Pack).

7 PRINCIPAL DATA

7.1 Readings

7.1.1 Readings on display on GA Pack / Full-feature (4-Fig. 7a) 1)

Ref.: **Air outlet pressure**
Reading: Modulates between programmed unloading and loading pressures.
Shown: On main display (Fig. 7b), when:
- switching on voltage
- selecting main display with keys <<Menu>> and <<Main>> (5-Fig. 7a)

Sensor: PT20

Ref.: **Compressor element outlet temperature**
Reading: 50-60 C above cooling air temperature
Shown: When using key <<More>> (5-Fig. 7a) on the main display (Fig. 7b)
Sensor: TT11

On Full-feature also:

Ref.: **Dewpoint temperature**
Reading: Approx. 4 C
Shown: When using key <<More>> (5-Fig. 7a) on the main display (Fig. 7b)
Sensor: TT90

7.1.2 Readings on gauges on GA Standard Pack (Fig. 9)

Ref.: **Air outlet pressure (Gp)**
Reading: Modulates between preset unloading and loading pressures

Ref.: **Compressor element outlet temperature (TSHH11)**
Reading: 50-60 C above cooling air temperature
Setting: 110 C

7.2 Setting of safety valve

The part number and set pressure are stamped on the valve. Also consult the Parts list. If the valve is malfunctioning, replace it by one with the same number. **No adjustments are allowed.**

7.3 Dryer control switches and refrigerant specifications on GA Full-feature

Dryer control switches	Cut-out pressure	Switch-on pressure	Unit
Fan control switch:			
GA11 up to -22	8.1	10.6	bar(e)
GA11/15 High ambient version	8.1	10.6	bar(e)
GA18/22 High ambient version	13	16	bar(e)
Dryer shut-down switch (only on TÜV-approved units):			
GA11 up to -22	18	-	bar(e)
GA11/15 High ambient version	18	-	bar(e)
GA18/22 High ambient version	25	-	bar(e)

Refrigerant		
Charge:		
GA11/15	1.5	kg
GA18/22	2.2	kg
GA11 up to -22 High ambient version	2.2	kg
Type:		
GA11 up to -22	Tetrafluorethane R134a	
GA11/15 High ambient version	Tetrafluorethane R134a	
GA18/22 High ambient version	Difluormonochlormethane R22	

7.4 Compressor specifications

7.4.1 Reference conditions

Nominal working pressure as stated below		
Air inlet pressure (absolute)	bar	1
Air inlet temperature	C	20
Relative humidity	%	0

7.4.2 Limitations

Maximum inlet temperature		
- Standard Pack/Pack	C	40
- Full-feature	C	35
- Full-feature designed for high ambient temperatures	C	40
Minimum inlet temperature	C	0
Minimum working pressure	bar(e)	4

1) See User manual for electronic regulator, sections "Modify settings submenu" and "More function".

7.4.3 Specific data of 7.5 bar compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	50	50	50	50
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	7.5	7.5	7.5	7.5
- Full-feature	bar(e)	7.25	7.25	7.25	7.25
Nominal working pressure	bar(e)	7	7	7	7
Power input					
- Pack/Standard Pack	kW	13.7	18.5	22.2	27.6
- Full-feature	kW	14.7	19.5	23.5	28.9
Temperature of air at outlet valve					
- Pack/Standard Pack	C	28	28	27	28
- Full-feature	C	23	23	23	23
Motor shaft speed	r/min	2930	2930	2935	2930
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	74	76	77	77

7.4.4 Specific data of 10 bar compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	50	50	50	50
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	10	10	10	10
- Full-feature	bar(e)	9.75	9.75	9.75	9.75
Nominal working pressure	bar(e)	9.5	9.5	9.5	9.5
Power input					
- Pack/Standard Pack	kW	13.2	18.1	22.6	27.3
- Full-feature	kW	14.2	19.1	23.7	28.6
Temperature of air at outlet valve					
- Pack/Standard Pack	C	27	27	26	27
- Full-feature	C	22	22	22	23
Motor shaft speed	r/min	2930	2930	2935	2930
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	74	76	77	77

7.4.5 Specific data of 13 bar compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	50	50	50	50
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	13	13	13	13
- Full-feature	bar(e)	12.75	12.75	12.75	12.75
Nominal working pressure	bar(e)	12.5	12.5	12.5	12.5
Power input					
- Pack/Standard Pack	kW	13.0	18.2	22.1	27.6

1) At reference conditions
2) According to CAGI PNEUROP PN8NTC2.2

Compressor		GA11	GA15	GA18	GA22
- Full-feature	kW	14.0	19.3	23.2	28.9
Temperature of air at outlet valve					
- Pack/Standard Pack	C	28	28	27	28
- Full-feature	C	22	22	22	23
Motor shaft speed	r/min	2930	2930	2935	2930
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	74	76	77	77

7.4.6 Specific data of 100 psi compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	60	60	60	60
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	7.4	7.4	7.4	7.4
- Full-feature	bar(e)	7.15	7.15	7.15	7.15
Nominal working pressure	bar(e)	6.9	6.9	6.9	6.9
Power input					
- Pack/Standard Pack	kW	14.3	19.0	22.4	27.0
- Full-feature	kW	15.5	20.2	24.0	28.8
Temperature of air at outlet valve					
- Pack/Standard Pack	C	28	28	27	28
- Full-feature	C	23	23	23	23
Motor shaft speed	r/min	3530	3535	3535	3525
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	76	78	79	79

7.4.7 Specific data of 125 psi compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	60	60	60	60
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	9.1	9.1	9.1	9.1
- Full-feature	bar(e)	8.85	8.85	8.85	8.85
Nominal working pressure	bar(e)	8.6	8.6	8.6	8.6
Power input					
- Pack/Standard Pack	kW	14.3	19.3	24.0	28.8
- Full-feature	kW	15.5	20.6	25.6	30.6
Temperature of air at outlet valve					
- Pack/Standard Pack	C	28	28	27	28
- Full-feature	C	23	23	23	23
Motor shaft speed	r/min	3530	3535	3535	3525
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	76	78	79	79

1) At reference conditions
2) According to CAGI PNEUROP PN8NTC2.2

7.4.8 Specific data of 150 psi compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	60	60	60	60
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	10.8	10.8	10.8	10.8
- Full-feature	bar(e)	10.55	10.55	10.55	10.55
Nominal working pressure	bar(e)	10.3	10.3	10.3	10.3
Power input					
- Pack/Standard Pack	kW	14.3	19.7	23.9	28.6
- Full-feature	kW	15.5	20.9	25.5	30.4
Temperature of air at outlet valve					
- Pack/Standard Pack	C	27	27	26	27
- Full-feature	C	22	22	22	23
Motor shaft speed	r/min	3530	3535	3535	3525
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	76	78	79	79

7.4.9 Specific data of 175 psi compressors 1)

Compressor		GA11	GA15	GA18	GA22
Frequency	Hz	60	60	60	60
Maximum (unloading) pressure					
- Pack/Standard Pack	bar(e)	12.5	12.5	12.5	12.5
- Full-feature	bar(e)	12.25	12.25	12.25	12.25
Nominal working pressure	bar(e)	12	12	12	12
Power input					
- Pack/Standard Pack	kW	14.4	19.5	23.9	28.4
- Full-feature	kW	15.6	20.7	25.5	30.2
Temperature of air at outlet valve					
- Pack/Standard Pack	C	28	28	27	28
- Full-feature	C	22	22	22	23
Motor shaft speed	r/min	3530	3535	3535	3525
Oil capacity	l	7	7.5	8.5	8.5
Maximum sound pressure level **2)**	dB(A)	76	78	79	79

7.5 Conversion list of SI units into US/British units

1 bar = 14.504 psi
1 g = 0.035 oz
1 kg = 2.205 lb
1 km/h = 0.621 mile/h
1 kW = 1.341 hp (UK and US)
1 l = 0.264 US gal
1 l = 0.220 Imp gal (UK)
1 l = 0.035 cu.ft
1 m = 3.281 ft
1 mm = 0.039 in
1 m^3/min = 35.315 cfm
1 mbar = 0.401 in wc
1 N = 0.225 lbf
1 Nm = 0.738 lbf.ft
x C = (32 + 1.8x) F
Δt1 C = Δt 1.8 F

1) At reference conditions
2) According to CAGI PNEUROP PN8NTC2.2